January • 1945

Vol. 2 No. 1

LONDON GUARANTEE BUILDING
Michigan Avenue at Wacker Drive

The Home of
**finish**
Monthly Trade Publication
*Published by*
DANA CHASE PUBLICATIONS
Address
360 North Michigan Avenue
Chicago 1
Telephone.....Central 1229

The only independently published trade publication devoted exclusively to Porcelain Enameling and Ceramic Finishing.

Editorial content includes Technical Information, Plant and Processing Articles, Educational Features, and complete Industry News coverage, both editorially and pictorially.

Free-controlled Circulation to those intimately connected with the Ceramic Finishing Industry.

To Others —
Subscription Price...$3.00 per year
Foreign Subscription
Price (U.S. Funds) $5.00 per year

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Printed in U.S.A.

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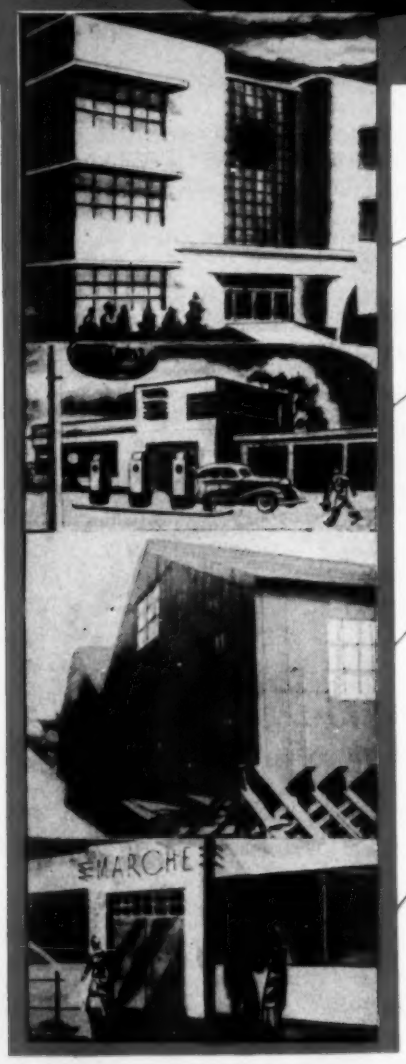


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# THE Finish Line

FINISH HAS A BIRTHDAY — let's glance at a picture of its first year of service by quoting brief excerpts from "The Finish Line" for 1944.

**Publication Policy** — *January, 1944*

Provide the Ceramic Finishing Field with its first independently published trade paper devoted exclusively to the Industry. . . .

Publish in attractive, modern, readable form a convoy for the best thoughts in the industry for the advancement of the entire ceramic finishing field.

Edit with open minds, unhampered by prejudices or subsidy, a publication endowed with complete freedom of action, both editorially and financially.

Your editor has full realization of the fact that the success of this new venture is as dependent on the active cooperation of the organizations in the industry as upon the Publisher and Finish writers. . . . *This is your publication* in which we will serve you to the best of our ability.

**"Stormy Weather"** — *February-March, 1944*

It is putting it mildly to say that since the inception of this first independent publication for the porcelain enameling and ceramic finishing industry it has had a stormy career. You have heard the question "What's in a name?" We had many compliments on the name Finish. One of our good friends said, "It sounds *too final.*" We say now, "It *sounds* entirely *too prophetic.*"

At this point we are back of our own goal line, but we will say this, If there is any way possible to furnish this industry with "a publication" that is both within the law and the rulings of W.P.B. we expect to do so, looking to the time when we can again offer you a publication of the type established with our January 1944 issue.

**Thanks Again** — *April, 1944*

We again want to express our appreciation to the contract advertisers and their agencies who have been exceedingly patient through a period when it was impossible for Finish to supply definite information with regard to future schedules. It has been necessary to return contracts from new advertisers desiring space in Finish due to the uncertainty of the situation.

With the uncertainty eliminated you will see Finish grow, and we hope to assist in the future growth of the industry as well.

**A Job to be Done** — *May, 1944*

With optimism in the wind, and with millions of dollars of potential business facing the industry, the easy and natural course might seem to be to "sit back and wait" for developments. There is every evidence that the leaders in our industry realize that to do this would be to invite a "kick in the pants" from competition after the war.

With the right correlation of effort, and a continued "punch" behind it, porcelain enamel should be headed for the brightest future ever.

**Power** — *June, 1944*

A program that would eventually lead our diversified groups, and the companies they represent, to "talking the same language" through their individual programs as they relate to porcelain enamel would furnish the "power" necessary to educate the buying public to a new appreciation of porcelain enamel — whether it be on a "victory model" range, a deep freeze, a water heater tank, or a four story building.

It's a big job, but the organization or individuals who could, through proper contacts and cooperative work, accomplish such coordination of effort over a reasonable period of time would render an incalculable service to our industry.

**Architectural Porcelain Enamel**—*July, 1944*

Of the new fields entered prior to the war, architectural porcelain enamel unquestionably shows the greatest promise. We have heard more than one porcelain enameler say, "There is too much engineering required in proportion to the amount of porcelain enameled steel used to make the market attractive."

No one could have attended the P.E.I. Architectural Forum in Cleveland on June 7 without feeling the potential possibilities in this market. It seems clear that *someone* can furnish all the services required to do a complete and effective job — coordination is all that is required.

**A Challenge** — *August, 1944*

A Challenge is presented to the porcelain enameling industry in the views of many of today's industrial designers. The industrial designer is playing, and will probably continue to play, an important part in the development of consumer durable goods for tomorrow — and the fact that many of them "shy away" from porcelain enamel as a logical medium is a point that should be taken seriously by our leaders.

It's high time we acquaint the designers with *today's* porcelain enameled metal and not let them continue with

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*Announcing*

# TI-NAMEL

## New Enameling Alloy Steel . . .

### . . . To Which a White Cover Coat Is Applied Direct—Assuring Superior Quality Finish, Longer Life and Lower Shop Costs

After years of intensive research and experimentation, Inland has perfected Ti-Namel, a titanium-alloy steel which eliminates the necessity of a ground coat.

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Inland Ti-Namel Steel reduces enamel shop reoperations, edging and scrap. It is fired at lower temperatures, and in shorter time. It increases enamel ware output without additional shop equipment, lowers over-all manufacturing costs and assures new and better enameled products.

Pending patent applications on the new enameling process and product made thereby are owned jointly by Inland Steel Company and The Titanium Alloy Manufacturing Company under trust agreement.

We will be pleased to send you our new bulletin on Ti-Namel and a copy of simple licensing agreement on request.

Inland Steel Co., 38 South Dearborn Street, Chicago 3, Illinois.

# INLAND STEEL

# Will porcelain enameled metal

## replace the masonry chimney

*By L. P. Brown* • VICE PRESIDENT, CONDENSATION ENGINEERING CORPORATION, CHICAGO, ILLINOIS

Exclusive feature finish

The use of porcelain enameled flues as chimneys in residential buildings will offer a new market to the industry, one that is vast and ready for development. How large it can be may be visualized by considering the large number of brick chimneys now planned for residential construction. Porcelain enameled flues will not replace all the brick chimneys, but a small percentage of the potential post-war homes which can be equipped with porcelain enameled flues will be a large number for a new product.

Market surveys of the number of American homes to be built after the war show an estimated 800,000 to 1,200,000 per year for a ten year period. Each house will require a chimney; some may have two or three — and the manufacturer of porcelain enameled flues can participate in this building demand. Many small commercial buildings will also be potential chimney users, and the total of such buildings will swell the above figure to 1½ million or more.

The war demand has given us a preview of the potential market and here is the picture as it appears near the end of 1944. Over 30,000 porcelain enameled flues have been made by Condensation Engineering Corporation for installation in Government Projects alone. All of these particular installations have been made since 1941. Of course this represents an inflated demand and is not a true picture of the new market. However, the post-war demand can rise far beyond this figure if the porcelain enameling industry will recognize and accept the responsibility which falls upon the manufacturer of a chimney.

Public safety will demand that the flues be completely safe. It will be up to the porcelain enameling industry to establish minimum safety requirements which must be built into each flue, for one manufacturer can destroy the entire market if he should sell unsafe flues at a time when public acceptance must be gained. The industry has witnessed the results of the installation of porcelain enameled flues which were considered unsafe at some Government Projects. Should this recur in post-war years, public confidence would be lost and acceptance would be a practical impossibility. Minimum standards of safety and durability would contribute to the certainty that all porcelain enameled flues are safe.

### History of the porcelain enameled chimney

A glimpse into the history of the porcelain enameled chimney will describe a more accurate picture and offer a true perspective of the present market as well as the potential future demand. This history extends back into the years and is a story of evolution rather than the description of a flue developed in a short time under stress of war demand. This picture of evolution is pointed out because it has made possible the necessary years of field testing required for the development of a safe and durable chimney. It has made it possible to prove many ideas and conduct laboratory research work which had to be pioneered in a new field and in a field which had very little engineering background. All of this work throughout the period of evolution was done with the assumption that a manufactured flue must be proved safe beyond all doubt before it can be offered to the market.

### Inefficiencies in present chimney construction

Practically no engineering or research work had been done to improve the brick chimney as a working part of the heating equipment. Its evolution and development has been to satisfy appearance demands rather than the combustion requirements. About the only engineering requirement was to make it a suitable draft producer or, as commonly expressed, "to make it draw." The amount of draft required for the most efficient operation of the heating plant was usually ignored in the design of the brick chimney.

It is generally accepted that the average hand-fired residential coal heating furnace or boiler operates at 30% to 45% efficiency. This wasteful operation can be improved through the use of the correct draft. Too much or too little will decrease the heating plant efficiency. If the draft is insufficient, too little oxygen will be drawn into the fuel bed and the combustion cycle will not be complete. Unburned gases will pass out through the chimney and be wasted. If the draft is excessive, more air than is required for complete combustion is drawn through the fuel bed. Each pound of excess air will absorb the heat required to raise the temperature of the air from room to flue gas temperature, and this is wasted through the chimney. The correct draft is like an efficiency peak wherein too little or too much is wasteful.

Another source of heat loss caused by the chimney (and generally con-

sidered unavoidable) is the inefficient operation of the heating plant while the chimney is coming up to the required temperature necessary to produce sufficient draft. This is an important source of heat loss where the heating plant is thermostatically operated and the operation is intermittently on and off many times throughout the day. Every time the thermostat turns the burner on, the time required to heat up the cool chimney will result in a period of operation when the draft is insufficient. At the end of the cycle when the thermostat turns the burner off, the retained heat in the chimney will continue to draw room air out of the house (which is replaced by outside cold air) and further, this room air is drawn over the heat exchange surfaces of the heating plant. This is a refrigerating action and the heat so picked up from the heating plant is wasted through the chimney until the chimney cools down enough to reduce the draft.

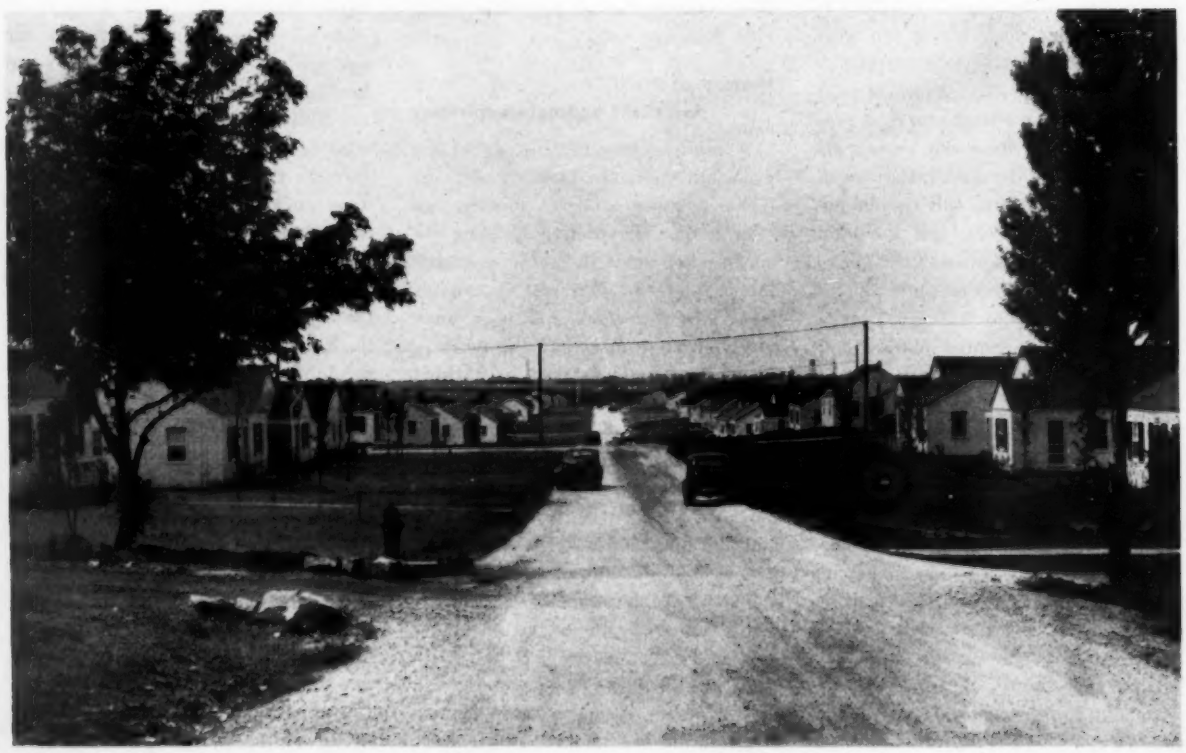
This heat absorption and heat retention of the masonry chimney (which occurs many times during the day with thermostatically controlled heating plants) is a sizable heat loss. The porcelain enameled flue greatly decreases this loss because it heats up quickly and cools off rapidly. This and other limitations of the brick chimney could be discarded in a new approach to chimney design offered by the use of porcelain enameled steel.

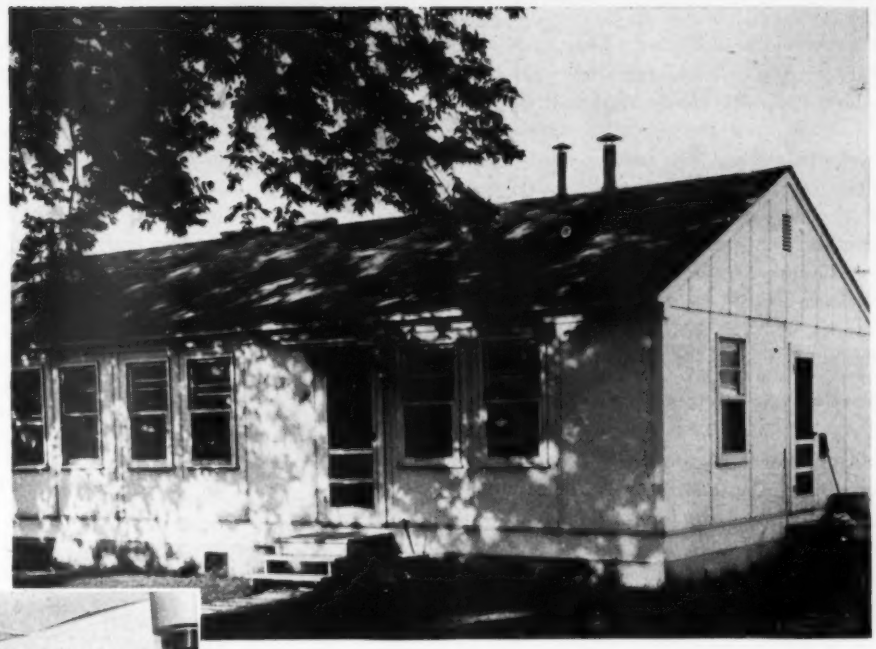
### Initial research started in 1929

Our company produced the first porcelain enameled flue to be offered to the market and gave it the name "Vitroliner." The initial research work was started about 1929 and an exhaustive survey of the effects of condensation in chimneys was conducted by our company. Many brick chimneys were inspected and laboratory analyses made of the condensate and the residue left from the acids in the flue gas. It was necessary to make a new approach to the question of flue gas venting and to study the basic requirements of a perfect chimney. The goal was to produce a manufactured flue which would come closer to satisfying these requirements than did the masonry chimney commonly accepted for residential heating plants. The limitations of the brick chimney could be discarded and a new approach made which was free from the preconceived notions regarding chimney requirements.

An exhaustive study was made of the chemical composition of flue gas and the corrosive action on various inorganic materials. It was found that the acids attacked the mortar at the joints of the flue lining and affected the brick surface. Some flue gas condensate was more destructive and the quantity of condensate formed contributed to the corrosive action. The chemical composition will vary with various types of fuel and with the particular kind of fuel of any one type. As an example: The Mid-Western Coals have quite a different chemical analysis than that of Eastern Coals and the corrosive action of the flue gas will be greater or less

*This scene is of the "Lidice" project just out of Joliet, Illinois. This town of 100 homes was later expanded to about 350 homes. The town's original name wa changed to "Lidice" after the report of the tragic massacre of the inhabitants of Lidice, Czechoslovakia, by the Nazis. All houses carry a single stack for an oil burning, hot air furnace with porcelain enameled chimney.*





*The exterior view of a double-unit installation at a Wilmington, Illinois, project. Note that in this type of war housing unit separate stacks are provided for space heaters and hot water heaters. Five hundred of each were required for this FPHA project. Homes vary from three to five rooms.*

*Typical kitchen in the Wilmington units. Porcelain enamel is represented here in table top, sink, oven, kitchenware and flue. Space heater flue is in the adjoining room.*

depending upon the sulphur, flue gas temperature and other factors. Also, the volume of condensate formed will depend upon the efficiency of the heating plant and this fact will also contribute to the corrosion problem.

### Basic chimney requirements established

By focusing attention on the engineering of a more suitable residential chimney, it became possible to define certain basic requirements. These can be stated briefly. The ideal residential type of chimney should be:

1. A draft creator which produces the motive power to draw oxygen into the fuel bed, when used in heating plants designed for natural draft operation. Where forced draft heating equipment such as stokers and blower operated oil burners are used, the comparable function of the chimney is to exhaust the products of combustion with sufficient draft to eliminate any possibility of pressure leaks.
2. A hot gas duct which will move the products of combustion from furnace to the outside atmosphere.
3. An insulating wall to protect the adjoining wood or other combustibles from high temperatures of the flue gas.
4. A lightweight structure which becomes an integral part of the house and requires no separate foundation.
5. A manufactured product which is not dependent upon the skill of local labor to make it efficient and safe and so designed as to permit speedy installation.
6. The protection of all interior surfaces against the highly corrosive action of flue gas.

### Corrosive action of flue gases a serious problem

A steel flue surrounded with sufficiently thick fire-proof insulation will meet all of the requirements listed with the exception of the last. Since this presented the greatest hurdle, our research was concentrated on protecting the interior surfaces from flue gas corrosion. This problem was investigated by our consultant, Prof. A. I. Andrews of the University of Illinois. The resulting protective coating of porcelain has been found through fifteen years of use to be impervious to flue gas condensate.

An interesting phase of the development of the A.R. enamel used was the consideration given to the

thermal shock to which this equipment would be subjected. Tests have been made where the flue gas temperature reached a maximum of 1700° F., and the porcelain enameled surface on the outside of the flue has been doused with water. Under these very severe tests, no chipping or crazing of the enamel is allowable because the interior steel surfaces must be fully protected against the flue gas condensate for the entire life of the flue.

### Special fabricating equipment designed

Of course many problems of design and fabrication had to be solved and it was necessary to design much of the metal fabricating equipment to solve the peculiar problems which came up. All of the equipment developed for metal fabrication was predicated upon the assumption that all steel surfaces would be subject to the 1575° F. firing temperatures of the porcelain and that, as the porcelain coated steel emerged from the furnaces, the necessary tolerance of the joints, etc., would be maintained. The use of dies has made it possible to interchange all parts of the porcelain enameled flue of the same diameter, whether they are produced now or five years from now. This is an important asset to incorporate in a new product so as to permit old customers to take advantage of improved design.

### War housing developments

In the early part of 1940, we were asked to develop a new type of lightweight chimney which could be used for war housing. The design was adapted to the specialized problems of wartime housing and a complete chimney was developed and tested by the Government Agencies interested. Two of the primary advantages in the porcelain enameled war chimney has been its adaptability to large quantity, speedy production and the fact that the design permitted installation with a team of two men.

The question of safety was carefully studied. We submitted a model known as Vitroliner Type "E" to the Underwriters' Laboratories for test. These tests resulted in Underwriters' acceptance of the flue for use with all fuels and minimum standards of safety were established, based on the Underwriters' tests.

### Stands severe heat tests

During these tests it was found that with a flue inlet temperature of 1000° for an extended period, adjoining wood parts on the roof and ceiling were no higher than 64° F. above room temperature. When the flue gas temperature was raised to 1400° F. (to simulate run-away fire conditions) the adjacent wood surfaces at the ceiling and roof reached a maximum of 106° F. above room temperature.

Subsequent tests made by other laboratories on brick chimneys indicated that the surface temperatures on the outside of the insulated portion of the porcelain enameled flue are less than those on the outside of the common brick chimney. No comparative tests have been made by the same laboratory to verify these indications, but it seems reasonable to conclude that the porcelain enameled flue is at least as safe as the brick chimney.

Insulation was separately tested at a continuous temperature of 1000° F. for 24 hours and the insulation was found to be structurally intact. It was also assumed that these flues would be subject to building vibrations and, accordingly, an accelerated vibration test was also made. This was done by applying an air hammer to the bottom section of the assembled flue. This severe test had no adverse effect on the insulation or the porcelain enameled flue assembly.

### Answering all of the basic requirements

Let's examine the porcelain enameled chimney in relation to the six requirements outlined previously and see how it stacks up, based on proven results both in the laboratory and in actual use.

*As a draft creator.* More draft per foot of chimney height is obtained within a much shorter warm-up time. As the hot flue gases enter the flue, the reflecting porcelain enameled surfaces, acting similar to the interior of a thermos bottle, will maintain higher flue gas temperatures throughout the entire length of the flue. Whereas, the brick chimney will absorb this heat, the porcelain enameled chimney will hold the heat in the flue gas. Thermostatically operated heating systems will operate at a higher efficiency much sooner after each startup. In the hand-fired heating plant sufficient oxygen is drawn into the fuel bed much sooner.

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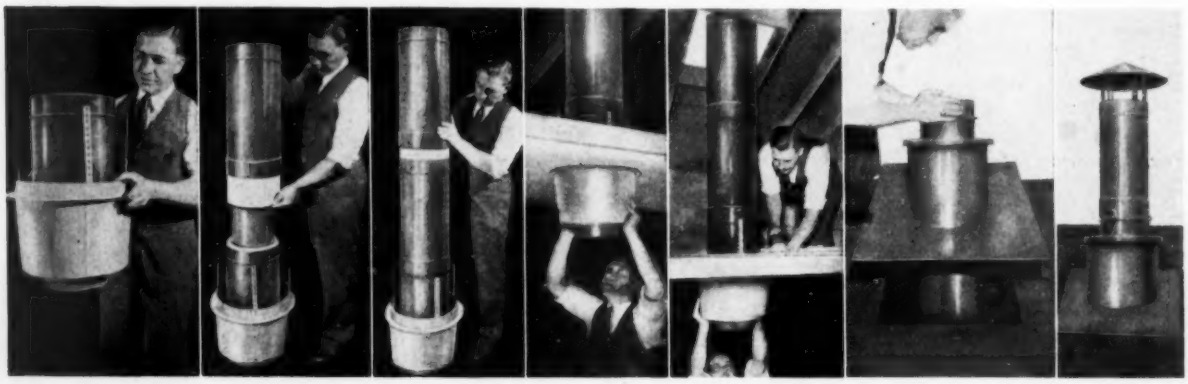
*Porcelain enameled flues can be designed for extreme simplicity of installation. These progressive photographs show installation steps for the flues described in this article.*



# Precision war production . . .

## a springboard to improved peacetime manufacturing

*By E. H. Shands* • DIRECTOR OF DEVELOPMENT AND ENGINEERING
GEO. D. ROPER CORPORATION, ROCKFORD, ILLINOIS

Exclusive feature finish

When war clouds were gathering in 1941, the Roper organization already was making plans to come to the aid of our nation if and when war actually developed.

For some time before Pearl Harbor the pump division, which dates from 1857, had been manufacturing rotary pumps, hand and windmill pumps, and shallow and deep well water systems and cylinders. The rotary pumps, in particular, were made for many essential war production purposes.

In the fall of 1941 production of armor-piercing projectiles got under way with existing plant facilities put to use to as great a degree as possible.

### New plant for projectiles

Shortly before, plans had been drawn up for building a separate plant for manufacturing these projectiles. Construction of this plant was started early in 1942 and production started in the new plant on March 1, 1942.

After both the pump and projectile manufacturing operations were rolling along under a full head of steam, our company also converted other existing production facilities to making ammunition boxes, aircraft landing gear, cake griddles and many other military items.

The pumps manufactured by our pump division have found their way to important usage on battleships, cruisers, destroyers, submarines and many vessels of the Maritime Commission. They have also been doing jobs in other manufacturing plants, for example, pumping oil to large production equipment.

Various caliber projectiles made here have been used effectively by American troops throughout the world. Other war materials built by our company have gone wherever G.I. Joe has gone.

Now let's look at the production picture in more detail and see exactly what happened.

### New standards of quality

Our company had, we believe, been recognized as a quality manufacturer. However, in looking back one can analyze how pre-war quality standards might have been further improved, particularly through a more far-reaching control system in the use of available materials.

Just as soon as the projectile manufacturing program was started quality standards were further sharpened. It became more apparent than ever that there was only one way and that was the right way. It was soberly reasoned that if, because of inefficiency on our part, one well-aimed armor-piercing projectile failed to do its job, the lives of American boys might easily be lost as a result.

At the start the rigid specifications established by Army Ordnance were frequently difficult to meet. Operations were slow and often inadequate. The services of skilled workmen were required on a wide-spread basis at a time when skilled mechanics were not plentiful in this particular community because many of them were engaged in Rockford's heavy machine tool industry which was rapidly reaching peak production.

As a good example of this condition, we might point to the operation of drilling the tracer cavity in the projectile. This definitely was a bottle neck. In order to do the job properly, large drill press equipment, requiring skilled mechanics, was necessary. Neither the equipment nor the personnel was available.

The problem was turned over to the company's engineering department who designed and built a special drilling machine, costing only a few hundred dollars. The sole purpose of this machine was to drill the tracer cavity.

This machine, which was completed in a remarkably short time, required only one unskilled operator and reached entirely new standards of accuracy. As a cooperative measure, our company made available to all manufacturing facilities drawings and specifications of this machine. A few of them were built for other facilities having no other way to secure them.

Another tough nut to crack was the operation of cutting the knurls for rotating bands on armor-piercing shot. This job had to be done right — all the way.

Again our engineers came to the rescue. They designed and built a highly successful knurling machine with remarkable performance in terms of both accuracy and speed. This machine, too, was turned over to all other similar caliber projectile manufacturers, who readily accepted the machine as an important contribution to their production.

The company, after hurdling these preliminary obstacles and others too lengthy to mention, became a full-fledged armor-piercing shot facility, producing at a surprisingly high rate with a high standard of quality. Just as things were beginning to look like we were "in the groove," developments of our enemies made the accepted type of armor-piercing shot obsolete and incapable of piercing new armor that had been developed.

*Here's the business end of a large "bulldozer" that forges high explosive projectiles in the Geo. D. Roper Corporation plant.*

This required the complete retooling of the machine shop and heat treating facilities in order to gear up for the production of a new improved type of armor-piercing shot.

### Doctoring a "headache"

A "headache" in connection with the newly-designed shot was the cutting of small notches in the projectile which were used to affix the cap.

The engineering department did such an outstanding job in this respect that one of its members received the Chicago Tribune war worker award for outstanding contributions to the war effort. As in the case of the other machines, this equipment was also made available to other facilities for their use.

The newly-designed shot required a special cap which, in turn, had to be crimped to the body of the projectile itself. The heat treating of this cap to its proper hardness was a long and slow process.

Being familiar with gas heat treating equipment, our engineers developed a special gas flame hardening machine which accurately measured and controlled the temperature of each individual cap before quenching. This established an extremely close process control of this operation, assuring a uniform product that contributed greatly to the splendid record enjoyed in the ballistic performance of Roper manufactured projectiles.

*This machine drills the tracer cavity in projectiles. It speeded production and made it possible to replace skilled mechanics by girls.*

Another major problem was that of utilizing the critical alloys incorporated in the type of shot which had become obsolete. Having had little previous experience in forging operations, we had no suitable forging equipment. This equipment was extremely difficult, if not impossible to secure.

### Forging on punch press equipment

Available, however, was heavy punch press equipment that had been used in fabricating sheet metal parts including the "turret" top for our gas ranges.

New dies were designed which made it possible to reforge the obsolete projectiles into those of an entirely different shape and kind by using the large punch presses.

Although we were advised against attempting to carry out this forging operation with this equipment and performing the forging with one heating, experimental work convinced our organization that the job could be done. This proved correct and soon the reforging program was in operation.

### Sheet metal shop used

In the early months of the war, when it was determined to convert to war production all existing manufacturing facilities, the sheet metal department was one of the first to step front and center.

A contract was secured for the production of sheet metal ammunition boxes for the United States Navy. Many of the standard procedures and much equipment in the department were quickly converted to the production of this item. This production also involved the use of accurate tools and jigs in order to hold the close dimensions required.

Our peace-time manufacturing activities in building a gas range with a unit chassis of internal construction presented a splendid background for the manufacture of the ammunition box.

A worthy challenge was that of developing seam welding and spot

welding techniques which would meet United States Navy specifications. Production lessons learned in this respect have given our organization a broad welding background which will prove invaluable in days to come.

**Enameling experience helped**

Although our organization had years of experience in finishing with porcelain enamels, there had been little previous experience with finishes such as hot dip galvanizing. It was our feeling that the basic principles involved were quite comparable. This proved to be the case. Soon the ammunition boxes were being galvanized in a specially-built galvanizing department.

Perhaps the most difficult field of all for us to master when first starting war production, was the field of metallurgy. True, we had used thousands of tons of sheet steel in prewar days in the manufacture of gas ranges. We also had used large quantities of cast iron, steel and nonferrous metals in the manufacture of pumps. However, up until the time of the war, material suppliers had been counted on to meet specifications as established by Roper.

Just as soon as extensive war production came into being it was quickly seen that a metallurgical department must be established promptly to establish scientific methods of process control.

**From enamel control to metallurgical control**

Because specialists in the porcelain enamel plant had been carefully trained in process control, these men were used as the nucleus for the new metallurgical control department.

In the case of the manufacture of projectiles, the experimental work had previously been carried out. The metals to be used were specified. The problem was not that of determining what metals to use but rather the using of the metals successfully.

Raw material shortages caused some discrepancy in qualities of the materials shipped in. Often it was necessary to establish a number of sources of supply for the same material. Uniformity throughout was recognized at once as necessary for successful manufacture.

*This especially designed machine forms a series of slots in the body of projectiles so caps are easily crimped on. It increased production 400%.*

In machining, uniform hardening and uniform structure of material were vital to maximum production. In heat treating, uniform structure was essential to attaining uniform results. Therefore, the metallurgical department embarked upon a program of determining all factors affecting production and developing scientific methods of controlling these factors.

The job did not involve the laboratory alone. It also brought the factory prominently into the picture. It called for a technical group of men who could work with the production department. Because the trained process control men had been associated with the factory on technical problems for some time, these men proved considerably more capable than would have been the case with men trained only in laboratory technique.

Feeling that uniform structure was the foundation for all metallurgical control, the laboratory closely checked this structure. In many cases suppliers did a splendid job of holding uniformity. In situations where the demands for uniformity were in excess of those that suppliers were able to furnish, processes were established in the plant to produce satisfactory structure.

*Over →*

*The carbon train in the metallurgical laboratory is one of many testing units added to Roper laboratory facilities.*

OFFICIAL U. S. NAVY PHOTOGRAPH

*Close-up of the open bow of an L.S.T. (Landing Ship, Tank). Roper power driven pumps open and close these doors. Shown rolling out is a medium army tank . . . a sight which the enemy has often seen.*

The control of the metal structure enabled us to double the cutting speed in a number of machining processes. By holding the structure uniform enough, a constant pressure has been maintained upon the cutting tools. Furthermore, uniform hardness has been maintained in the finished product through the heat treating department by controlling the hardness factor within lower limits than ever before seemed possible.

Basically the close control of structure has had a tremendous influence on the performance of shot at the Ordnance proving ground.

### Laboratory facilities expanded

In order to do an overall thorough job, laboratory facilities of the company were greatly improved and expanded. A complete metallurgical laboratory was the ultimate result. A metallographic department consisting of a microscope, necessary specimen preparation equipment, dark room equipment, etc., was the first step.

The chemical laboratory was expanded with an electro-analyzer having platinum electrodes for the quick determination of non-ferrous metals, a photolometer for quick determination of several of the other elements in steels, a carbon train for the accurate determination of the carbon content, and other chemical equipment including chemical balances necessary for determining elements by straight wet process chemistry.

A further step was the establishment of the physical laboratory in which a finished armor-piercing shot could be dissected and polished in a few minutes. This made possible a complete analysis of the results of the hardening process made at short intervals.

A Rockwell machine was put to use in determining the hardness of the hardened materials. A Brinell machine was used for determining the hardness of the materials as received at the machines.

Close checks were maintained of all these factors, including the final structures made at the microscope. This did much to stimulate the maintenance of peak production with a minimum of time lost in manufacturing operations because of improper results in the heat treating and machining departments.

### Using the knowledge gained

It soon became apparent that a further desirable objective was to extend many of the lessons learned in projectile manufacture over into the pump division where pumps were being made for the Navy, Maritime Commission and Air Corps.

Here the problems were even more complex. In many cases we specified our own materials. Furthermore, the kinds of steel used frequently did not come direct from the mills so variations of structure were more pronounced.

Since the establishment of the metallurgical laboratory, materials to be used in pump manufacture have often been heat treated to establish a uniform structure before machining has been started.

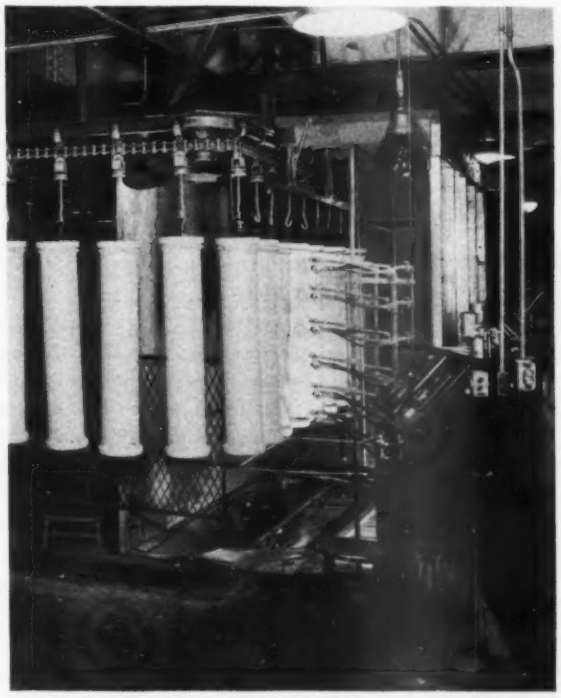
The personnel of the laboratory was considerably increased in order to make possible the expansion of laboratory controls throughout the entire pump operation.

Technicians in the Roper metallurgical laboratory are firmly convinced that the basic principles of process control, when properly applied, will have a definite bearing on porcelain enameling in the period that lies ahead. With the best of equipment and a well trained process control department, we look forward to the peace-time production of gas ranges with real anticipation. Although porcelain enamel could be maintained at a high standard of quality before the war, it will be further improved when the peace-time production of our gas ranges is once again started on a full time basis.

# Electrostatic spraying offers new possibilties for enamel application

*By Richard E. Helmuth,* ENGINEER, HARPER J. RANSBURG CO., INDIANAPOLIS, INDIANA

THE most recent development in methods of application for porcelain enamels is the electrostatic spray which may well have a pronounced effect on some features of porcelain enameling. This process uses an electric field to precipitate enamel, sprayed from an automatic spray gun onto the panel or item to be coated. High voltage is established by means of a power pack into which is led 220 volt, single phase, 60 cycle current. The secondary voltage is a maximum of 130,000 volts, single phase, half wave, 60 cycle current with a maximum secondary current rating of 10 milliamperes.



The electrostatic field is established between electrode wires located parallel to the conveyor and the grounded surfaces to be coated. The electrodes are negative at high potential, while the item being coated is positive and ground potential; hence, any particle sprayed into this field will become charged negative and tend to be forced to the positive grounded item by the force of the electric field. When this particle is deposited it immediately loses its charge and adheres to the item, thus building up a film of enamel to give the desired coating.

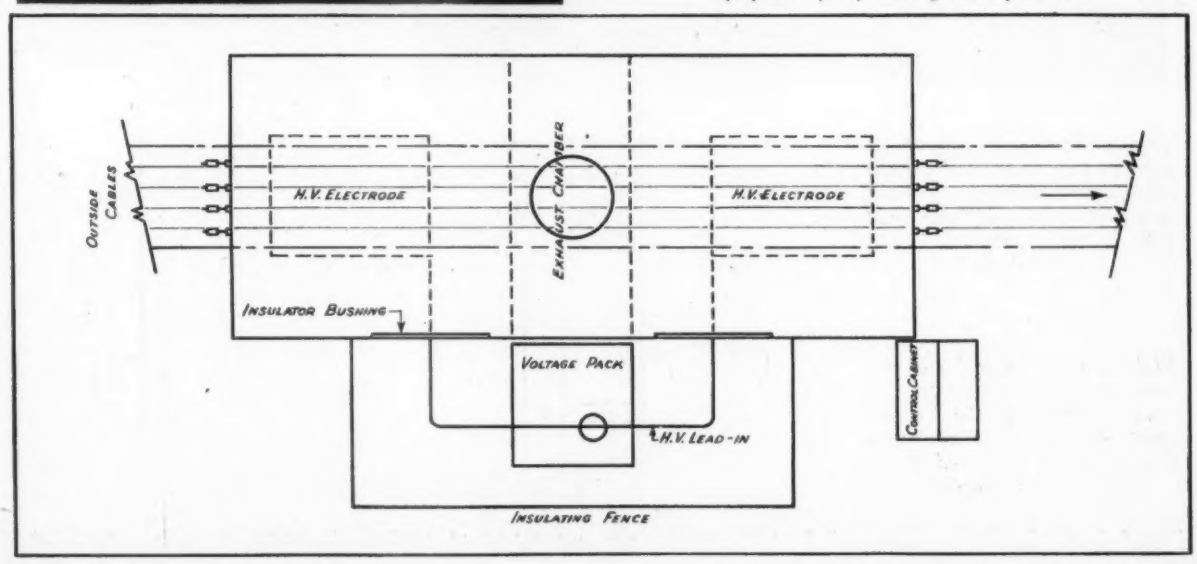
### Electrically grounded conveyor used

This process necessitates the ware to be coated being carried on an elec-

*to Page 48* →

*This photograph shows a typical installation of electrostatic spraying equipment on a continuous conveyor line in the plant of the Florence Stove Company, Gardner, Mass. This installation is one of two in the Gardner plant used for the application of organic finishes to war products. This type of installation is said to have saved up to 50% on material, and changed the necessity for the cleaning of spray booths from twice daily to approximately once every six weeks.*

*Drawing shows typical arrangement of electrostatic spray equipment for finishing stove panels.*



# We use pickling tanks

## that are built to last

*By N. R. Klein* • MANAGER, CALORIC GAS STOVE WORKS, TOPTON, PENNSYLVANIA

CONSIDERABLE interest has been expressed in the design of the pickling tanks which were installed in our Topton plant in March of 1939. It seems, therefore, that specific information regarding the design of these tanks and the service obtained from them may be of general interest to the porcelain enameling industry.

Prior to the installation of the present units, wood pickling tanks had been used — both plain and lead lined. On the average these tanks lasted from two to three years. During this period there was always considerable maintenance cost, loss of time due to shut-downs for repair and loss of acid.

Investigation revealed that there had been developed new acid-proof materials and methods of construction which were being widely used throughout the steel industry for 60-foot to 300-foot tanks used for the continuous pickling of steel strip and batch pickling of steel billets, rods and heavy plate. It seemed reasonable that this type of construction could be adapted to tanks for the pickle room in porcelain enamel plants.

### Design of tanks

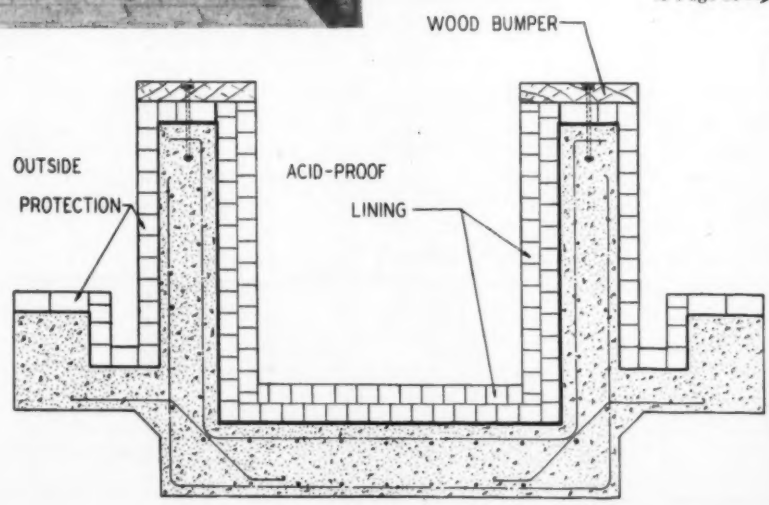
For our particular plant layout the construction can be detailed as follows:

1. Construct a reenforced concrete tank, vibrating the concrete to obtain a dense structure, and using plywood forms on the inside to obtain a smooth finish. The tank must be heavily reenforced, particularly at the corners.
2. Apply a 3/8" thick impervious plastic membrane. This membrane serves as the liquid-tight seal and allows the brick lining to expand and contract independently from the reenforced concrete outer supporting structure.
3. Protect the plastic membrane from mechanical damage or excessive temperature by a lining of acid-proof brick joined with acid-proof cement.

The acid-proof brick used for this type of installation are made of de-

*to Page 50* →

*Above: This photograph shows a tank of the type used for the continuous pickling of steel strip with 25% sulphuric acid 220° F. This tank is 165' x 9' x 3' deep.*




*Right: This drawing shows construction details for the type of tank installed in the Topton plant of Caloric Gas Stove Works, and as described in the accompanying article.*

# The how and why
## of sign advertising

*By Ken M. Davee* • DAVEE, KOEHNLEIN AND KEATING, CHICAGO, ILLINOIS

### PART X • Roadside signs

finish Exclusive feature

Well-placed, well-planned roadside signs do their advertising job by flashing your name and your local dealer's name to prospective buyers as they enter marketing centers. Thus they do an identification job.

But they do more than that. They *create* sales of items bought regularly and frequently, such as foods, beverages, tobacco and gasoline.

They divert sales to individual advertisers by directing buyers to their places of business. This is exemplified by hotel advertising.

#### Signs sell the masses

Finally, they do a mass advertising job that pays dividends over and above all these other values. A motorist sees Campho-Phenique or Pennzoil or Blue Coal advertised by frequent signs placed at intervals over long distances. He gathers the impression that these products have national distribution, that they are widely used, and that therefore they are reputable, well-known products. And if they are advertised elsewhere, roadside signs recall and substantiate all the other advertising the motorist has read and heard. Thus roadside signs do effective and inexpensive mass advertising work.

Roadside sign advertising, like all sign advertising, offers the advantage of complete flexibility. Signs may be allocated to markets in direct proportion to the size of the job to be done. If you are particularly well represented by sales outlets in one city, you can concentrate your coverage there. On the other hand, if you have had trouble lining up adequate representation in a city, you may want to place a circle of roadside signs around it to help you break down resistance to the point where you can make satisfactory contracts with the dealers you need.

The experience of the Sahara Coal Company is a case in point. They placed more than 100 roadside signs along the main highways leading into St. Louis. Then they began using newspaper insertions as sales representatives began soliciting additional dealers. Qualified dealers were found to be exceedingly receptive and adequate distribution was quickly obtained.

Similar success stories are common. Burma-Shave is an example with which everyone is familiar. But there are literally dozens of roadside sign users from the top-rung advertisers to small city hotels, restaurants and department stores that enjoy similar success with such signs.

#### Who uses roadside signs?

In order to get a picture of the variety of roadside sign users, and the coverage they were getting, a survey was made of the signs along the main highways leading into a typical Middle Western Market—Peoria, Illinois. The following list shows the broad cross section of business which employs roadside signs in this market:

*Gasoline and Oil*

Aladdin Gasoline
Cities Service
Coryell 70
Deep Rock
Gold Penn Motor Oil
Kendall Motor Oil
Mobilgas — Socony-Vacuum
Pennzoil
Phillips 66
Prize Motor Oil
Quaker State Motor Oil
Riley Brothers Oil Co.
Shell Gasoline & Oil
Sinclair Gasoline & Oil
Skelly Gasoline
Standard Red Crown Gasoline
Sweeney Gasoline
Valvoline Oil
Veedol Motor Oil
White Rose Gasoline — Enarco Motor

*Tires*

Gillette Tires
Hunt Tire Shop

*Accessories, Supplies*

Champion Spark Plugs
Chicago Motor Club
Iriquois Auto Insurance
Motorola Auto Radio
Simonize Polish

*Automobiles*

Chevrolet
Hudson
Nash

*Soft Drinks*

Coca-Cola
Dr. Pepper
Hire's Root Beer
Howel's Root Beer
Nehi
Nichol Kola
Orange Crush
Royal Crown
7-Up

*Beer*

Alpen Brau
Blatz
Budweiser
Cook's Beer
Edelweiss
Fox Deluxe
Gipps
Miller's High Life
Old Mug Beer
Pabst
Patrick Henry
Schlitz
Silver Beer
Wagner
Zoller's

*Cigars, Cigarettes, Tobacco*
Camel Cigarettes
Champagne Velvet Tobacco
Emerson Cigars
King Edward Cigars
Old Gold Cigarettes
Phillies Cigars
Prince Albert
Red Dot Chewing Tobacco
Red Man
San Felice Cigars
Spark Plug Tobacco
Union Leader

*Liquors*
Clarke's Pure Rye

*Drugs, Drug Stores*
Burma-Shave
Campho-Phenique
Chandler Drugs
666 Cough Remedy
Peoria Drugs

*Ice Cream, Candy*
Curtiss Baby Ruth
Rozzell's Ice Cream
Red Sails Candy Bar
Smooth Sailing Candy Bar

*Department Store*
Klein's Department Store (50 signs)

*Clothing*
Lee Overalls
Red Goose Shoes

*Foods*
Dutch Oven Bread
Howe's Bread
Karo Corn Syrup
Morton's Salt
Producer's Dairy
Rival Cat and Dog Food
Schwab's Dairy
Strand's Bread
Toastmaster Bread

*Building Supplies, Fuel*
Blue Coal
Kendall Coal
Kingston Lake Gravel
Mark Twain Coal
Sahara Coal
Sargent's Paint
Thermal Coal

*Household Equipment*
ABC Washer
Knox Furnaces
Norge Appliances

*Farm Supplies*
Blue Seal Feeds
Country Life (Magazine)
DeKalb Hybrid Seed Corn
DeLaval Cream Separators
Funk's Hybrid Seed Corn
Pfister's Hybrid Seed Corn
Prairie Farmer (Magazine)
Prime Electric Fence

*Insurance*
Mutual Fire Insurance
Illinois Banker's Life

*Hotels*
Hotel Jefferson
Pere Marquette Hotel
Schimmel Hotels

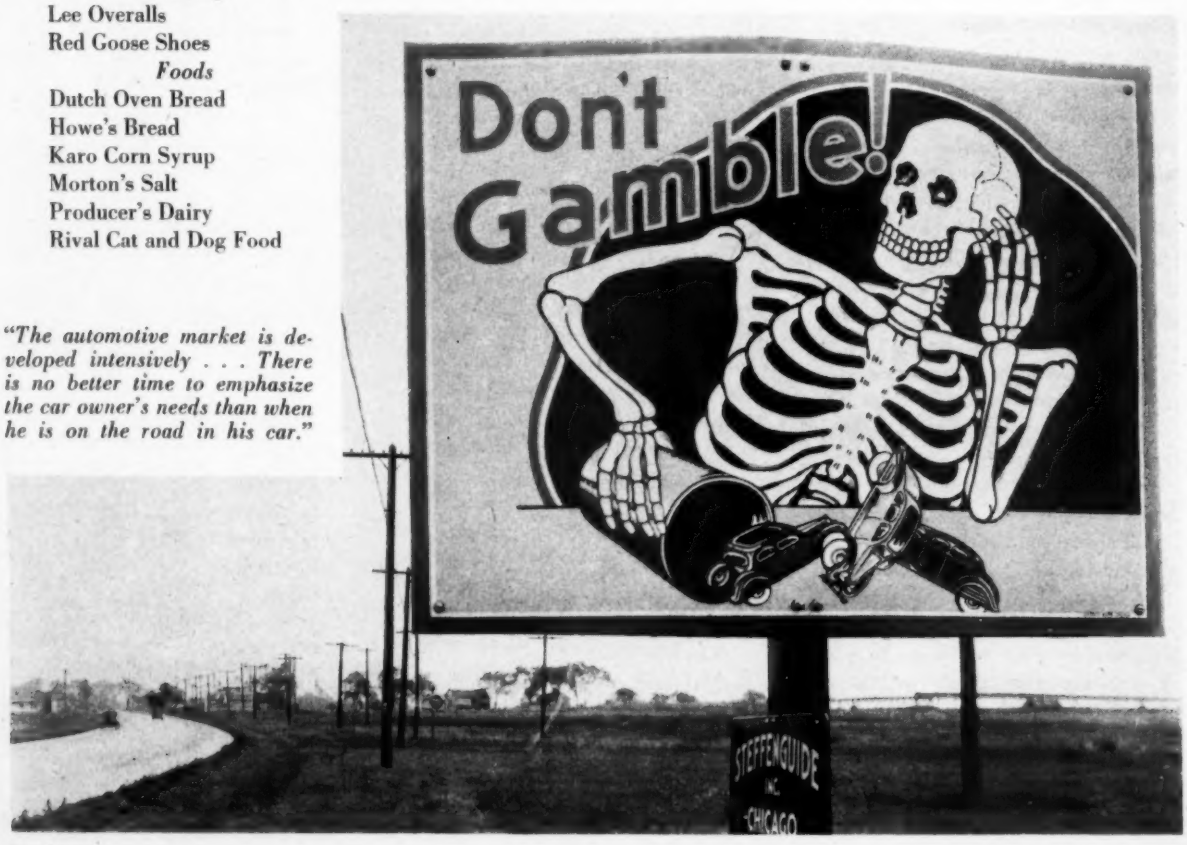
*Miscellaneous*
Gamble Stores (chain)
Illinois Bell Telephone Co.
Peerless Dry Cleaning
Peoria Spring Company
West Sheet Metal Works

This list does not include the users of the regular outdoor advertising poster services. Only those advertisers who furnished permanent or semi-permanent signs were considered.

Analysis of this list indicates the nature of the opportunities for economical advertising that await roadside sign users!

First, the automotive market is developed intensively. The reason is apparent. There is no better time to emphasize the car owner's needs than when he is on the road in his car. The only tire advertisers represented among these signs were the signs of two local tire shops—one of which had 22 signs placed on the roads leading into the test city. If that tire dealer's signs had carried the name

*"The automotive market is developed intensively . . . There is no better time to emphasize the car owner's needs than when he is on the road in his car."*



of a nationally advertised tire, they obviously would have done an outstanding job for the tire manufacturer in this market of over 100,000 people.

### Remind buyers frequently

Secondly, products purchased *frequently* are well represented in this sign showing. They include bread, milk, tobacco, soft drinks, beer, gasoline, ice cream and candy.

These advertisers know the value of taking advantage of every possible opportunity to suggest their products to prospective buyers, and they know the additional value of reaching buyers while they are enroute to a source of supply.

But some other advertisers with similar products to sell are missing. Take flour, for example. Flour consumption is heaviest in rural areas. Flour advertising consistently appears in farm publications. Why isn't the rural housewife reminded of those famous flour brand names while enroute to the market?

### Sign advertising opportunities

Coffee is another product that meets the requirements for successful roadside advertising. It is purchased frequently. It is used universally. The name of the brand is important. A roadside sign campaign will tie in with other advertising, do a mass advertising job in this way, and impress the name on the minds of those who are on a grocery shopping expedition. The list of foods, universally known and frequently purchased, that are competing with each other for the consumer's dollar is endless. Roadside sign advertising is another important medium that can be used to impress on the buyer's mind the trade name of such products.

Third, the spot check list of roadside sign users illustrates the importance of this advertising medium as a means of reaching the farm market. Advertising messages on signs reach the farmer while he is on his way to buy his supplies. The want list is made out; he is open to suggestions. Foods, work clothing, farm equipment and supplies, automotive requirements — these and all other needs on the farm may be advertised economically and directly to the farm market by means of roadside signs.

### Key to the farm market

Many other advertisers catering to the rich farm market would do well to consider the value of sign advertising. For instance, just before the war was the time to build the importance of a brand name in the new and ever-increasing market for pneumatic rubber tires for tractors. (The job will still need to be done after the war.) Roadside sign advertising will reach the eyes of prospective buyers at insignificant cost.

Other items for which this medium can be profitably used include tractors themselves, automobiles and automotive accessories, fertilizers, fencing materials, farm machinery, stock feeds and remedies, paints and building materials, fuels and heating equipment, appliances (as rural electrification and the use of "bottled gas" increases), and the thousand and one other items necessary for the operation of a farm.

A new and successful use of signs in selling the farm market is illustrated by the sign campaigns of the seed houses that sell hybrid seed corn and other seeds. These companies follow up customers who buy their seeds in each community and post signs identifying their customer's crops as being produced with their seeds. The crop itself substantiates the sign and produces a powerful sales appeal. Others who could make use of similar "demonstration" campaigns include nurseries, producers of commercial fertilizers, manufacturers of farm equipment, manufacturers of paints, millers of stock feeds, and many others. The visible proof of the use of the product would be evident, substantiating the sign.

DeLaval enjoyed the reputation of being the best known cream separator for years and years because of the front gate sign with the copy reading "DeLaval Cream Separator Used Here." Similar endorsement exhibited on the best managed farms would have a similar effect today.

Roadside signs are, of course, the preferred medium for reaching tour-

*"A roadside sign campaign will tie in with other advertising, do a mass advertising job in this way, and impress the name on the minds of those who are on a grocery shopping expedition."*

ALL PHOTOS FOR THIS ARTICLE COURTESY GENERAL PORCELAIN ENAMELING & MFG. CO.

*"Most advertisers agree that roadside sign advertising is both economical and effective." . . . "These advertisers employ signs to place their message exactly where they want it, inexpensively yet effectively."*

ists, advertising hotel and camp service, service station service, resorts and local institutions. Tourists have learned to depend on roadside signs to guide them to stopping places and local spots of scenic interest along their routes.

Some manufacturing plants employ signs along roadsides surrounding the cities where they are located to let tourists know they are approaching the home of a certain well-known product. The institutional advertising appeal usually includes an invitation to visit the plant. Schools, such as the Chillicothe Business College at Chillicothe, Missouri, have attracted students from a wide area by the use of signs placed along all roads within a radius of several hundred miles of the school. These advertisers employ signs to place their message exactly where they want it, inexpensively yet effectively.

### How to get roadside signs erected

Most advertisers agree that roadside sign advertising is both economical and effective. They would use it if they could solve the problem of getting the signs erected.

It is true, of course, that unless the sign is small the salesmen can not erect it. And dealers, even though part or all of the cost is handled by the manufacturer, in some cases will not be able to "find time" to have their signs erected unless they are closely checked and prodded by the manufacturer's salesmen.

It is best, therefore, in those cases where the cost is to be shared with the dealer, to have your price include the cost of erection. Then your salesmen can arrange with local sign service organizations to erect and look after your signs. An alternative arrangement is one in which you employ a sign service organization directly to handle all your sign erection and service work. Organizations are available that will contract to handle all the details, including arranging for the ground lease and maintaining the signs.

### Ground lease is necessary

A ground lease is necessary for roadside signs. They must be erected on the property adjoining the roadway, of course, and leases for their erection must be made with those who own the property. Local laws must be investigated first. A lease gives a certain amount of protection to your sign. Once having accepted compensation for permitting a sign to be erected, the land owner will go out of his way to protect the sign. Recently, farmers have fought the abolition of signs in order to protect the advertiser's interest, and in this way insure the income they receive from rentals.

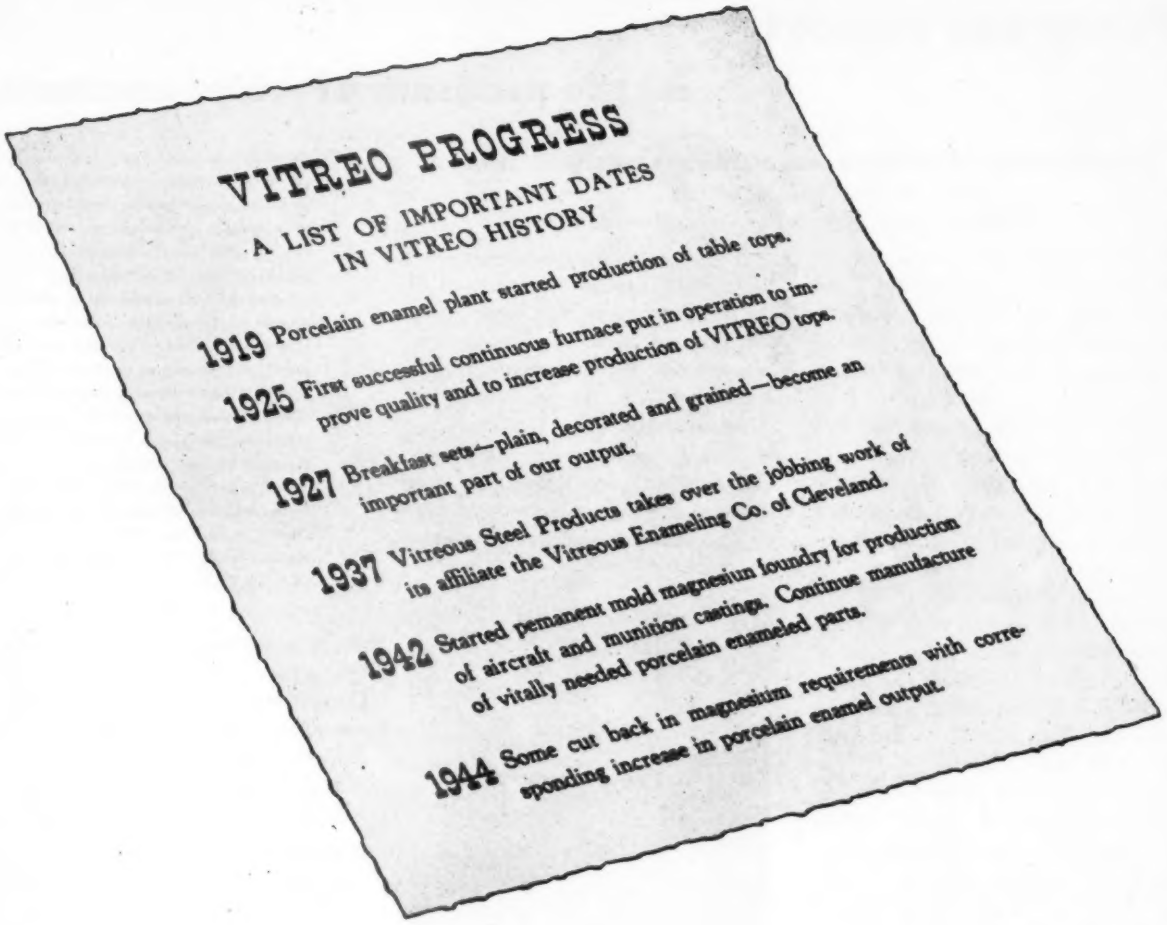
While the rentals themselves are ordinarily modest, they represent an unanticipated profit and cause the landowner no expense or inconvenience. The productivity of the land is never interfered with because the sign user as well as the farmer prefers to have the sign as near the fence line as possible. If the ground is rough and a promontory some distance away from the fence offers a better location for the sign than the land along the fence line, an arrangement for a lease can be made at the more desirable location. In such cases, the land is seldom useful for cultivation anyway and consequently has small value.

### Rentals paid

Since the productivity of the land isn't affected by the erection of a sign close to the fence line, the rental required for a sign lease is ordinarily no more than a dollar. However, one company with a sign program numbering more than 6,000 roadside signs discovered that a butcher knife had far more appeal and was appreciated much more than an equivalent cash amount.

This company purchased a large quantity of high quality knives and offered them in return for the lease

*to Page 48* →


VITREO PROGRESS
A LIST OF IMPORTANT DATES
IN VITREO HISTORY
1919 Porcelain enamel plant started production of table tops.
1925 First successful continuous furnace put in operation to improve quality and to increase production of VITREO tops.
1927 Breakfast sets—plain, decorated and grained—become an important part of our output.
1937 Vitreous Steel Products takes over the jobbing work of its affiliate the Vitreous Enameling Co. of Cleveland.
1942 Started pemanent mold magnesium foundry for production of aircraft and munition castings. Continue manufacture of vitally needed porcelain enameled parts.
1944 Some cut back in magnesium requirements with corresponding increase in porcelain enamel output.

YES, FOR 25 YEARS we have been learning to make better and better table tops, breakfast sets and many other porcelain enameled parts for leading manufacturers in varied industries.

During every one of those 25 years we have been improving our equipment — adding to it constantly until today we are operating one of the most modern shops in the industry.

It is your shop if you want us to form and enamel parts for you. Or if you prefer, we will enamel your stampings. Maybe we can help in design. Send us prints or samples for quotation or engineering advice.

★ ★ ★

**VITREOUS STEEL PRODUCTS CO.**

BOX 1791, CLEVELAND 5, OHIO *(Factory at Nappanee, Ind.)*

# Progress report

## on the program of white enamels

### Application of white enamels direct to sheet steel

*By* DR. G. H. MCINTYRE

*Director of research, Ferro Enamel Corp., Cleveland, Ohio*

**JUST one year ago, in January 1944 Finish, we published expressions of opinion by leading research and technical men in the industry concerning the possibility of attaining the "Utopia" of applying white cover coat enamels directly to the base metal. We are not in position to state editorially to what extent this may prove feasible in postwar production enameling plants. We DO know there has been a great deal of effort spent on this development by enamel plant operators, steel producers, frit manufacturers and other suppliers to the industry; and that, as a**

LET me here and now make it clear that my discussion of the application of sheet steel enamels to the metal base without the conventional blue ground coat is wholly in the sense of a progress report. It is not, in any sense, to be construed that I am announcing the commercial application of white cover coats directly to the metal base as an accomplished fact. This development of the enameling industry is not yet ready for commercial exploitation. I can say that recent commercial trials of white cover coats and white ground coat on steel conducted by three frit companies in cooperation with a steel and stove manufacturer were both highly successful and encouraging.

Ever since commercial enameling has been practiced, enamelers have dreamed and striven to eliminate the black ground coat, accepting it only as a necessary evil for a good bond and workability. The light gray or semi-transparent ground coat in reality was of no benefit when employed with the super-opaque cover coat enamels that came into general use about ten years ago, because in order to reach a reflection factor of sufficient magnitude for a satisfactory coverage, as much cover coat enamel was required as with the conventional blue ground coat. Also, generally, these light gray or semi-transparent ground coats left much to be desired in workability, quality, and durability. Thus the many attempts to apply light color or white enamels on the steel by various methods, some patented and some not, were never very successful except in a few special instances such as for certain types of holloware.

During this war period, the enameling industry, while diverting its normal energies and facilities to the manufacture of war material, has nevertheless not entirely overlooked its obligation to the improvement of the post war enameling. Many of its key research men have managed to devote a considerable amount of time and attention to the continuance of their enamel studies. The industry as a whole has learned to accept new ideas and it expects to enter the post war period with better products, better raw materials and better methods.

FINISHFOTO

At the April 1943 meeting of the American Ceramic Society, in a paper entitled "A Free Industrial Enterprise Challenge — Will Ceramic Industries be Prepared for Continuity of Change?" I stated — "The porcelain enameling industry must be prepared to meet this (new materials available in the post war period) competition fully with better products and lowered costs." I asked, "Do we have enamels that can be applied in one white or light colored coating on these metal bases without a so-called ground or grip coat without loss of production standards?" I am happy to report to you that the frit companies and the enameling sheet manufacturers have been working continually and harmoniously on this problem with many satisfactory results. The general problem can be divided into three natural categories:

1. *The steel sheet.*
2. *The enamel.*
3. *The technique of application.*

#### The steel sheet

Without question, a better steel sheet is required; one which will have a minimum of reboil, lend itself readily to cleaning, develop bond without excessive oxidation, and maintain satisfactory drawing and working characteristics. The steel companies are appreciative of their responsibilities and have been cooperating with the frit companies and others in striving for improvement in their product. I believe that much progress has been made and that a better enameling stock will be available in the post war period — even for the application of the conventional blue ground coat.

#### The enamel

Our own company has approached the enamel phase of the problem from two points of view:

1. *An enamel which can be applied as a cover coat directly on special steels.*
2. *An enamel of high opacity to be applied as ground coat to the present enameling stock.*

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# applied directly to the base metal

**result, decided progress has been made.**

**The two reports appearing on these pages are taken from papers presented before the recent stove industry meeting, and offer the first comprehensive material presented publicly on this subject.**

**While these authors represent only two of the many companies who have been diligently working on the problem, their reports serve to illustrate the progress that has been made thus far and they offer evidence that real progress has been made since our first report to the industry just one year ago.**

## Special alloy steel aids "white on steel" development

*By* FRANK R. PORTER

*Ceramic engineer, Inland Steel Co., Chicago, Illinois*

I AM well aware that there is no need to point out the good qualities of porcelain enamel, the qualities which have kept it sold and in increasing quantities for many uses for many years. I know equally well there is no need to point out to you the shortcomings of porcelain enamel finishes as we have known them.

We have gotten along pretty well to date with porcelain enamel . . . Competitive materials have given a little cause for anxiety, but in the main have not been too seriously considered because they either lacked the desirable qualities of porcelain, were not competive in cost, or were structurally unsuitable.

Improvement in some competitive materials and the lowered cost of production of some others have changed this picture in the last three or four years. They now have become a serious threat to the enameling industry.

There are two main drawbacks, I believe, to porcelain enamel in the minds of the manufacturers. One is the difficulty in getting production out in the prescribed number of coats; the other, damaged ware. The two are somewhat inter-related in that the fewer enamel coats applied (less enamel thickness), the less likelihood of damage to the enamel on the finished part.

### A maximum thickness limit decreases rejects

Many companies recognize this and set a maximum thickness limit, scrapping or de-enameling parts having a greater thickness than the maximum set.

The industry has known for many years the effect of enamel thickness on mechanical damage. Much work has been done, particularly by the frit companies, to reduce the thickness required for a satisfactory finish. Ground coats have been improved to provide a better base for cover coats. Super-opaque whites have been developed so that now we can have high reflectance with appreciably thinner coatings.

FINISHFOTO

It has long been felt that a huge step forward would be made in solving the enameling problems if white enamels could be applied directly to the metal. Frit and steel companies have carried on much research work to attain this goal. It was realized that if this could be accomplished, costs could be reduced and quality greatly improved because of the thinner enamel coatings. The ideal finish would consist of one coat of white finish enamel applied directly to the metal base. However, it is found that when white finish coat enamels are applied to the standard enameling irons of pre-war days and fired, the resulting finishes are, more often than not, full of enamel blisters and specks. It is evident then that improvement must be made in the base metal.

### Carbon is the trouble maker

The prime cause of the blistering in white enamel finishes applied directly to mild steel, or to the standard enameling iron, is carbon in the metal. At enameling temperatures, this carbon combines with constituents in the enamel, forming gases which escape from the metal and blister the enamel coating.

If the carbon could be eliminated from the metal, or could be tied up in some manner so as to be non-reactive, it should then be possible to enamel that metal with white enamels alone and the finish obtained should be relatively free from enamel blisters, specks, etc.

We have found that if the carbon in the metal is fixed or stabilized with titanium, the metal then becomes a satisfactory base for the application of white enamels. This metal is found to have other desirable properties also.

Titanium, when added to steels under the proper conditions, forms a comparatively stable titanium carbide —Ti C. Theoretically, the ratio of titanium to carbon is 4 to 1. This titanium alloy steel has several remarkable properties which make it of unusual interest to the enameling trade.

### Characteristics of special alloy steel

The drawing quality of this alloy steel is good. Bomb noses, ammuni-

*Over* →

tion cases, stove tops, and other similar parts of difficult draws have been made satisfactorily from this alloy. In addition, parts of shallow draw, such as stove end panels, draw quite true to design from it. We believe the metal can be classed with the best deep drawing steels.

This alloy steel does not age strain so that it can be used without fear of obtaining strain lines in areas of critical draw regardless of elapsed time from production by the mill to use by the customer.

The metal is more resistant to sagging at enameling temperatures than the standard enameling irons. The superiority of the alloy in this respect has been noted recently in enameling refrigerator liners. Liners of five cubic foot capacity, fabricated from 22 gauge titanium alloy steel, were enameled with white enamels applied directly to the steel. They were fired in a continuous furnace and each liner was suspended from the furnace by two lugs welded to one end of the liner. The enameled liners were found to be remarkably true to shape.

In another instance 18 gauge titanium alloy steel was also used for the top and bottom in experimental liners. These parts produced satisfactory liners where the regular enameling iron had not. These liners were given a ground coat and two coats of white in order to duplicate accepted production conditions.

This alloy steel welds satisfactorily, but to date gas welding with a filler rod has not produced a satisfactory weld for white enamels applied directly to the weld. Seam and spot welds are satisfactory. Gas welds are satisfactory where the two metals to be joined are fused together without the use of filler rod.

### Results of enameling tests using production equipment

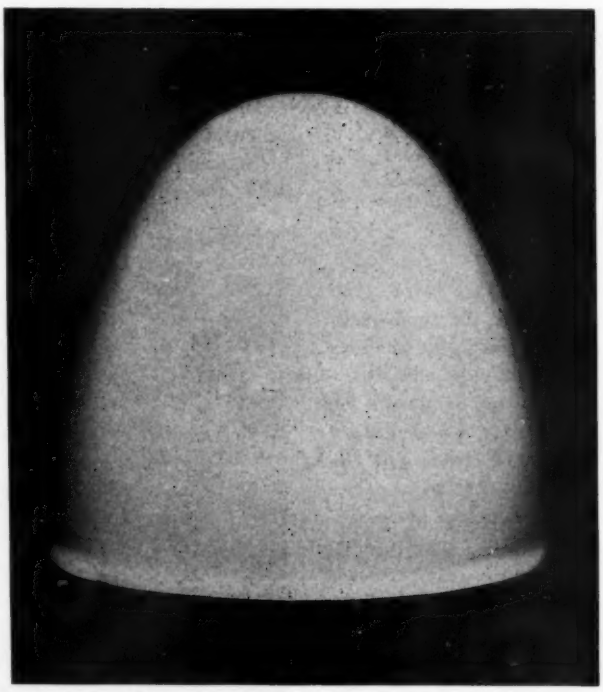
This titanium alloy steel has remarkably good enameling properties. It does not reboil and white enamels applied to it do not show the tendency to blister and blackspeck as do white enamels applied to regular enameling iron. This means much to the enameling industry as enamel blistering and specking is the cause of a majority of reoperation and scrap with the regular enameling iron.

In a recent run of some 800 or 900 stove parts fabricated from this titanium alloy steel, and enameled with white cover coat enamels only, satisfactory finishes were obtained with a total enamel thickness of from .006" to .009." The .006" thickness was applied on refrigerator liners in one coat and the finish had a reflectance of approximately 67%. The .009" thickness was on exterior stove parts and the finish had a reflectance of approximately 73%.

The thinner coatings have the great advantage of high resistance to damage. It is interesting to note that none of the above stove parts were damaged in assembling, and no special precaution was maintained in assembly. It is also interesting to note that none of these parts were brushed or edged.

It should also be pointed out that the absence of reboiling in the metal is of value where the standard cobalt ground coat and cover coat system is used. A stove plant in the Middle West has used a sizable tonnage of this metal for enameling with ground coat plus two white coats. Reoperations were reduced from 2% to 4% on a part where reoperation normally ran from 12% to 15%. The total enamel thickness of the three coat finish was approximately .010" (.003 G.C.plus .007 finish) and had a reflectance of approximately 72%.

We should like to be able to tell you that all you need to do is to purchase this titanium alloy steel and a suitable white enamel and proceed to enamel as usual with cobalt type ground coats. Such is not the case.



*This deep drawn part (size 8 inches diameter by 7½ inches deep) was made from 18 gauge titanium alloyed steel, formed in two operations without intermediate annealing and then finished with one coat of white porcelain enamel.*

We know that the cleaning and pickling of this steel must be carefully carried out to provide a satisfactory base for the application of white enamels. Also, a controlled deposit of nickel is necessary for satisfactory adherence.

In conclusion, we believe the results of work to date indicate the production possibilities in a well controlled shop.

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*Watch* finish *for future developments in steels, enamels, and processing methods related to "white on steel" and other important problems.*

# Porcelain enamel institute

## Cleveland meeting

A MEETING of the Porcelain Enamel Institute was held in Cleveland, Ohio, at the Hotel Statler, on December 5. Important Institute business was conducted in a morning business session of the Board of Trustees. At a luncheon meeting, to which Institute members and guests were invited, Mr. P. Everett Lockhart of Lockhart International, New York City, spoke on "Industry Publicity."

*President R. H. Turk*

An afternoon "general session," attended by Porcelain Enamel Institute members and interested representatives of the industry, was crammed full of information of interest. Speakers included Professor A. I. Andrews, University of Illinois, who spoke on "Test Standards" and their relation to product use; C. L. Van Derau, works manager, Westinghouse Electric & Mfg. Co., Mansfield, Ohio, whose subject was "Production Control"; and R. F. Bisbee, manager of quality control, Westinghouse Electric & Mfg. Co., Mansfield, who presented material to supplement and illustrate Mr. Van Derau's presentation.

During the general session, presided over by R. H. Turk, Institute President, a brief outline of the Institute's committee structure was presented, as well as a discussion of plans, as approved by the Board of Trustees for tackling major problems.

### New market development committee

President Turk reported on the program of the operating committees, one of which is the new market development committee which held its initial session at the William Penn Hotel, Pittsburgh, on November 6.

The working committees under this group constitute a market development policy committee, consisting of nine members, and a market development action committee consisting of four members.

The policy committee, as its name indicates, will direct the general activities, cooperating with the market research committee and determining long-range policies. The action committee, on the other hand, will meet regularly (meetings are being held at present about once a month) to work with the Institute's advertising agency to handle the more detailed problems of the Institute's promotional program.

**Porcelain Enamel Institute Committees**

*Market Development Policy Committee*

R. A. Dadisman, American Rolling Mill Co., Chairman
H. D. Thompson, Chattanooga Stamping & Enameling Co.
R. J. Ritchey, Carnegie-Illinois Steel Corp.
E. A. Headland, Enamel Products Co.
J. W. Vicary, Erie Enameling Co.
J. A. Stewart, O. Hommel Co.
J. H. E. McMillan, Ingram-Richardson Mfg. Co.
J. A. Holcomb, Wolverine Porcelain Enameling Co.
Edward Mackasek, Porcelain Enamel Institute

*Market Development Action Committee*

R. A. Dadisman, Chairman
R. J. Ritchey
J. H. E. McMillan
Edward Mackasek

*Other Working Committees*

Forum Committee
Market Research Committee
Name and Trade Names Committee
Process Development Committee
Products Standards Section (Formerly, Technical Research Section)
Architectural Committee

### Dadisman outlines objectives

R. A. Dadisman, chairman of the market development policy committee, outlined the work that is being done currently through Institute channels and agency council, and illustrated his outline with charts showing plans, ad reprints, Institute literature,

FINISHFOTO

*Managing director Edw. Mackasek*

etc. He offered the following as the major objectives of the advertising program: Remind prospective users; develop specific inquiries; develop new markets and applications; stimulate flow of merchandise through sales channels; and develop prestige for the Institute as an authoritative information source.

The working theme of the program will include the direct benefits of porcelain enamel to users, its adaptability to a variety of problems and its economy in use.

In closing, he presented Harold Downing of Walker and Downing, Pittsburgh, the Institute's advertising counsel.

### Test standards

In his discussion, Professor Andrews told of the effective cooperation of the kitchenware division in

the porcelain enameling industry with regard to test standards, and pointed to the general improvement in production standards resulting through this cooperative effort.

FINISHFOTO

*Professor Andrews*

The speaker candidly pointed to examples of lack of standardization within the enameling field. He referred, for instance, to eight different types of measurement for testing impact; a number of adherence tests, all different; and lack of standardization in tests for gloss and other enamel characteristics. He feels that the P.E.I. solubility test is good, but is not being universally used in the field. Credit to the Bureau of Standards for its work in assisting in the standardization of reflectance and thickness tests was given.

He described the development of impact, thermal shock, solubility tests, etc., and the cooperation in the kitchenware group in connection with purchasing the necessary equipment for plant testing, which has led to overall improvement.

Professor Andrews put in a word to the executive group in behalf of the technically trained ceramic man, who he said has far too often been placed on control work in the enameling plant and forgotten. He pointed to the lapse of approximately ten years (including the period of the war, plus four years for training new men after the war) before there could possibly be an adequate source of technically trained men, and suggested to the enameling group that it would be well for them to make their division of the ceramic industry appealing to the men who would be selecting their future work.

**Production control**

Mr. Van Derau gave an extemporaneous talk to the group in the down-to-earth manner which is characteristic of his talks. As an introduction he offered a slogan for plant management which he credited to Tom Watson, formerly with National Cash Register Company: "*To be successful — organize, deputize, supervise.*" To this he adds "*dramatize.*"

Organize is to have a plan, and any plan beats none at all. Deputize is to delegate work to others, and not depend on too much centralization of responsibility. Supervise is to follow through with delegated responsibility. Dramatize is to make the other functions more readily understood and smooth working.

The speaker pointed particularly to tremendous savings possible in enameling operations through complete standardization of all materials, processing operations and finished products. One note of warning was offered in connection with "experimental work." "Don't experiment in the production shop," said Mr. Van Derau.

*Mr. Van Derau*

Carry on development work in laboratories, and prove it time after time before such developments are considered for production use.

In connection with personnel training, he pointed out that in his organization they never take a green operator into any part of the plant without first providing him with a brief, condensed training program. Included in such a training program is information on company policies and standarization program information. At the Westinghouse plant production control and standardization starts with every type of raw material and carries through all operations in manufacturing, including full consideration during the engineering stage of planning.

## Industry Publicity

FOLLOWING an analysis of the economic factors which, in his opinion, will result in postwar inter-industry competition on an unprecedented scale, P. E. Lockhart made the following comments concerning the porcelain enamel industry:

"The porcelain enamel industry has for the years immediately ahead one great advantage. It produces a quality product. The spectacular increase in national income due to war production has made it easier to sell quality than has been the case at any time during our generation. The nation is determined in one way or another to prevent wide scale unemployment, and postwar income of 120 or 130, even 150 billion dollars is the goal. Retailers throughout the U. S. report an increasing tendency on the part of all classes of consumers to buy the best of everything that is offered. They have more money to spend and many for the first time are learning the wisdom of choosing quality goods. Also, more manufacturers than ever before are quality minded. They are producing huge quantities of war goods, regardless of cost but with highest quality imperative. When the war is over it will be easier to convince people that although porcelain enamel may cost more, it is worth more.

"But you must study and analyze the methods and promotion activities of competition. In the current Tide

*to Page 50* →

# Twelfth annual meeting

## Institute of Cooking and Heating Appliance Manufacturers

THE annual meeting of stove men, under the able chairmanship of R. B. Hurt, vice president, Hardwick Stove Company, Cleveland, Tennessee, was held in Cincinnati, Ohio, at the Netherland Plaza Hotel, Wednesday, Thursday and Friday, December 6, 7 and 8.

As is usual at this three-day meeting, Wednesday was devoted to the Institute business conducted by the Board of Trustees, and afternoon meetings for several of the specialized divisions.

### General session

Thursday was the big day with the call to order at 10:00 A.M., Henry H. Morse, vice president, Florence Stove Company, Gardner, Mass., presiding, and a final windup at 7:00 P.M. consisting of the president's reception and dinner, with John E. Russell, president, Majestic Manufacturing Company, St. Louis, Mo., and Institute president, acting as toastmaster. Between these hours was an extremely heavy program containing much of importance to the stove industry.

### "Set your course now"

The talk under this title, by Lyle C. Harvey, president, Bryant Heater Company, Cleveland, Ohio, offered some sound suggestions for present planning by stove manufacturers based on experience in the industry.

### Future sales and profits

The next speaker, Edward P. Wells, sales manager, Ben Greenberg and Brother, Chicago, had as his subject "Can Stove Manufacturers Increase Sales and Profits in 1945 and 1946?" This speaker has a wide background of merchandising experience, having been formerly vice president and sales manager of the Eureka Vacuum Cleaner Company, and has had intimate contact with the stove field as a former executive of Kalamazoo Stove and Furnace Company.

According to Mr. Wells' way of thinking, it is high time for every manufacturer to cast aside wishful thinking and get down to some good hard work. It won't be possible in the future to continue along the usual customary lines of business procedure and come out with a profit at the end of the year, as we are heading for the greatest competitive business battle on record. To add to normal intra-industry competition, there will be new people in the industry offering a *new* competition.

A good example of production change to meet new conditions is the "ice box." By bringing an obsolete product up to date and developing buying reasons the manufacturers of the old-fashioned ice box were in position to capitalize on an unusual demand.

"Do it now," says Mr. Wells. Promote, insofar as possible, a continuous evolution from war to post-war when the "take it or leave it" type of selling will be a thing of the past. Wise companies are advertising *now*. There is no reason for most companies to spend money at present for "immediate business" — they want to get the *lead* now.

Here are some of the things to think about and decide upon without delay:

*Organization and personnel*—Scan your organization carefully today and cut out the dead wood, even if it is necessary to pay pensions. Pay what a man is worth. Get the best, give key men the authority, and then acknowledge a job well done.

*What to manufacture*—Small companies should manufacture only what can be sold in volume in a given territory. Concentrate on your market. Stove men should study packaging, as repair parts are important to the "profit and loss" of every stove company.

*Methods of distribution* — Make a thorough survey of the company's entire operation before deciding on channels. Specialized selling is important.

*Promotional activity* — Get an advertising agency of appropriate size to fit your company. Make the most of sales contest possibilities. "There are few industries having as little national promotion as the stove industry."

*Prices* — The manufacturer who says, "I don't know what my costs are. I just make a stove and sell it

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*Section of Hall of Mirrors, Netherland Plaza Hotel, in which the general session meetings of the ICHAM were held.*

# GOOD MERCHANDISING
## includes
# GOOD PACKING

**WOODEN BOXES AND CRATES—ALL KINDS**

Plywood • Wirebound • Hinge Corner • Nailed Crates • Wood-Steel • Nailed Wood • Shop and Tote Boxes

★ Consult with our packing engineers. We offer you the services of our designing and testing laboratory without obligation.

CHICAGO MILL AND LUMBER COMPANY

111 W. Washington Street Chicago 2, Illinois

*Pioneers for Over 60 Years*

*Plants at:* Helena, Ark. • Greenville, Miss. • Tallulah, La. • Chicago, Ill. • Plymouth, N. C.

→*from Page 31*

to meet competition." must learn that prices have to be in relationship to the value given. Don't continue obsolete practices just because "we have always done it that way." This applies to both office and factory.

*Competition* — The greatest competition, says Mr. Wells, will come from kindred lines. People can't possibly buy everything they want, even if they spend *all* their savings. The stove industry must produce demand.

### The stove export market

Franklin Johnston, editor of "American Exporter," gave many facts and figures related to export markets for the stove men in his talk "Potential Stove Export Market — Postwar." He feels that foreign competition in logical importing countries is not too important to the stove industry if exporting is approached in the right manner. He pointed to the fact that for thirteen years following the last Armistice there were more export sales than in the previous one hundred and thirty years.

Latin America's imports from the major exporting countries show:

From the United States....35%
From Germany .....16%
From England .....11%

A bit of advice was given to executives in the suggestion that they learn *not* to talk export business with visiting representatives from other countries, but to leave these important conversations to the experienced export man who knows his people and their manner of thinking.

The future of export business will depend to some extent on the spread of a high living standard which, in a sense, means the spread of American customs.

### Dividends from war production

Arthur Stockstrom, president, American Stove Company, St. Louis, Mo., spoke on the subject of "Making War Production Experience Pay Dividends in Peacetime Operations." He outlined in detail many of the possible problems coincidental to the manufacturing of the varied line of war products such as American Stove plants are producing. He dealt with specific instances in order that his listeners could readily tie experiences described to comparable possibilities for the production of other than war items.

### Labor relations

This subject was covered by C. F. Mugridge, partner, Rogers and Slade, Management Consultants, New York City, in his talk, "Looking Ahead at the Problems of Labor Relations." Said Mr. Mugridge, "Both management and labor are looking for Utopia rather than to accept differences of opinion." There will always be controversy, but it should be constructive. There should be no attempt to set up submissive employees. The secret of good labor relations, or any other relation, is "consultation." To think that labor and management are natural enemies is to destroy the principles upon which business rests.

Men must be trained in industry who are *capable* of properly handling labor relations. They must not only be capable, but *strong* and equally *firm* with both management and labor. They must stick to their convictions and avoid paternalism. They must not be hamstrung by management. We need to develop *organization* and supervision so that responsibilities are adequately outlined. The desirable result is a thorough understanding of individual responsibility.

### Labor for civilian goods production

This subject, complete title for which was "Labor Outlook in Relation to Civilian Goods Production," was to have been covered by E. R. Lerner, assistant chief, Industrial Allocation Division, War Manpower Commission. In his absence Mr. J. B. Montgomery, industrial labor specialist, gave the stove men the current picture, explained the rulings with regard to the use of labor for civilian production and offered hypothetical illustrations to explain his points.

### Governmental controls

Samuel Dunckel, managing director of the Institute, spoke briefly on the subject of "Present Day Governmental Controls and 1945 Prospects."

Speaking on prices, he said, "Manufacturers will have to prove to Government that higher costs have eaten up profits before price relief will be obtained. As a factual supplement to Mr. Dunckel's remarks, a booklet was furnished to all registrants covering the governmental orders and regulations affecting the manufacture, distribution and pricing of cooking and heating appliances.

### Of interest to enamelers

Closing speakers on the general session program covered a subject of prime importance to the enameling industry, as well as the stove manufacturers.

Dr. G. H. McIntyre, director of research, Ferro Enamel Corporation, Cleveland, spoke on the subject of "One-Coat White Enamels."

F. R. Porter, ceramic engineer, Inland Steel Company, Chicago, covered the subject "New Steel Sheets for Enameling."

Both of these semi-technical discussions are presented in full in this issue of *finish*.

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### Divisional meetings

Friday was taken up, as is the usual custom, by meetings of the various divisions of the industry, including: electric range division, gas range division, oil division and solid fuels division.

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### New officers

I.C.H.A.M. officers for the current year are:

*President* — Henry H. Morse, vice president, Florence Stove Company, Gardner, Mass.

*Secretary and Treasurer* — Foskett Brown, president, Gray & Dudley Company, Nashville, Tennessee.

*Vice President (Membership)* — R. B. Hurt, vice president, Hardwick Stove Company, Cleveland, Tenn.

*Vice President (Publications)* — A. P. Chester, president, Globe Corporation, Kokomo, Indiana.

*Vice President (Meetings)* — H. S. Minster, president, Roberts & Mander Stove Company, Hatboro, Pa.

*Vice President (Chairman of executive committee)* — M. F. Cotes, vice president, Motor Wheel Corporation, Lansing, Mich.

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# Building "sales pull" into store fronts with porcelain enamel beauty

THERE is big business in prospect for the enameling industry among the chain-store organizations, department stores and individually owned shops.

Merchants all over the country are planning to build greater "customer attraction" into their store fronts to meet the return of keen competition in unrestricted markets. Many of their plans will include the use of clean, smooth, colorful porcelain enameled sheets.

Inside the store too—for shelving, trim, racks, show cases, display fixtures, counters and working surfaces —the use of this easily cleaned, durable material effects worthwhile savings in labor costs and in reduced damage to destructible goods.

The enduring beauty of the porcelain enameled finish depends upon selection of the right metal base. For this purpose— by a special process— U·S·S VITRENAMEL Sheets are produced.

These sheets are light and strong, can be drawn, stamped and formed, are also sufficiently rigid to use for flat areas. Their treated surface enables the frit to establish a firm bond when fired. The uniformly high quality of U·S·S VITRENAMEL Sheets is assured by rigid control of each special process in their production.

These are some of the advantages you can offer store owners and all other customers when your solid color and attractively designed porcelain enamel panels are based on U·S·S VITRENAMEL Sheets. Upon request, our technical staff will be glad to discuss your individual problems with you in full detail. Write today, this service is absolutely free.

## U·S·S VITRENAMEL SHEETS

**CARNEGIE-ILLINOIS STEEL CORPORATION**
*Pittsburgh and Chicago*
Columbia Steel Company, San Francisco,
*Pacific Coast Distributors*
United States Steel Export Company, New York

*BUY MORE THAN BEFORE IN THE FIFTH WAR LOAN DRIVE*

UNITED STATES STEEL

# NEWS

### DeVilbiss moves Cincinnati office

The DeVilbiss Company recently announced the removal of its Cincinnati District Sales Headquarters to 410 American Building, Central Parkway and Walnut Street.

The company believes the new facilities will enable them to offer improved service to the trade in the Cincinnati District.

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### New G-E range sales manager

Announcement has been received from General Electric that effective January 1, 1945, J. F. McBride has been appointed sales manager of the range division.

McBride joined G-E's appliance and merchandise sales promotion division at Cleveland in 1937, and since that time has had extensive experience in the promotion of the company's electric ranges, including work as advertising supervisor for the range and water heater divisions, and range and water heater representative for the west central district.

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### Philco man heads refrigerator advisory committee

W. Paul Jones, vice president in charge of the Refrigerator Division of Philco Corporation, has been elected chairman of the OPA domestic mechanical refrigerator industry advisory committee.

Mr. Jones joined Philco in 1938 to head the company's refrigerator division. He had previously been a distributor with Frigidaire, advertising and sales promotion manager for Servel, Inc., and executive vice president of the Home Appliance Division of Fairbanks Morse and Company.

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### Frigidaire man finds home in France

There is a touch of human interest in the story of Pvt. William Madden, Dayton, Ohio, who is serving with General Patton's Third Army in France, in connection with a recent one-day furlough.

As the story goes, it was a tired and homesick Pvt. Madden who was walking down one of the main streets of Nancy, France, when upon looking in the window of a home appliance shop he saw a picture of his sister-in-law, Mrs. Thelma Wellbaum Stark of Dayton, Ohio, smiling at him from the top of a Frigidaire refrigerator. Sure enough, this was a picture of Thelma, who was a former employee of Frigidaire.

Old home week continued as he walked into another store and there saw a National Cash Register and a Dayton scales — two other products from his home town. According to Madden, the furlough — even though for a single day — was well worth while.

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### Florence Stove acquires Marshall Stove Co. Lewisburg plant

Another step in the Florence Stove Company's plans for postwar expansion in the cooking and heating fields was disclosed recently when President R. L. Fowler announced that arrangements have been completed for Florence to acquire the property of Marshall Stove Company, Lewisburg, Tennessee.

*R. L. Fowler*

"We intend," said President Fowler, "to revamp completely and to expand the present Marshall factory. Plans are already under way for additional buildings. The entire plant will be newly equipped with the most modern machinery for the manufacture of stoves and heaters. As conversion makes it possible, we expect to produce in this new plant Florence

Gas Ranges, LP-Gas Ranges, Oil Ranges and Oil-burning Heaters."

According to the announcement, the acquisition of the southern plant is for the purpose of offering better service to Florence dealers in the South. Also, it is stated, additional production facilities are necessary to handle national dealer business. The Lewisburg plant, together with plants in Gardner, Massachusetts and Kankakee, Illinois, gives the company three strategic locations for the large scale production of stoves and heaters.

President Fowler also announced that George B. Colburn, superintendent of the Florence factory at Gardner, Massachusetts, for the past sixteen years, has been elected a vice president of the company and is going to Lewisburg to assume full charge of the new southern factory. William E. Burns, assistant superintendent, succeeds Mr. Colburn as superintendent of the Gardner factory.

Lewis Moore, Jr., will continue as president of Marshall Stove Company, whose entire production facilities are engaged in war work. It is emphasized that this war work will continue without interruption so long as it is required by the armed forces.

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### Posthumous award of McGraw Medal to former G-E appliance sales manager

The James H. McGraw Medal for Cooperation was awarded to Carl M. Snyder for his work in advancing better housing and the collective action of all branches of business and industry which he brought about for that purpose.

The award was presented to his widow, Mrs. Snyder, by S. B. Williams, secretary of the Committee of Awards and editor of "Electrical World," at a dinner attended by representatives of the building and electrical industries. Mr. Snyder was general manager of appliances for General Electric at the time of his death, August 14, 1943.

Award of the Medal to the late Mr. Snyder was sponsored by Howard Myers, editor of "Architectural Forum," Kenneth K. Stowell, editor of "Architectural Record," Joseph B. Mason, editor of "American Builder," and Kenneth Reid, editor-in-chief, "Pencil Points."

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### New research engineer at American Foundry Equipment Co.

John C. Straub, for the last thirteen years associated with the Research Laboratories Division of General Motors Corp., Detroit, has been appointed research engineer of American Foundry Equipment Co., Mishawaka, Indiana.

Mr. Straub has been actively engaged in the study of the durability and fatigue life of automotive and aircraft transmission and spur gears, and is co-author with J. O. Almen of the General Motors Research Laboratories of several technical papers dealing with this and other subjects.

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Gilbert D. Dill has been appointed a member of the sales engineering staff of American Foundry Equipment Co. He will be engaged in the development and application of blast cleaning equipment in the rolling mill industry.

Mr. Dill, a patent holder on several industrial developments, was last with Arthur G. McKee & Company, Cleveland.

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### Army-Navy "E" awarded to Great Lakes Steel

The Great Lakes Blast Furnace and Machine Divisions of Great Lakes Steel have been awarded the Army-Navy "E".

Admiral Edward L. Cochrane, chief of the Bureau of Ships, who returned recently from battle areas in the Pacific, said that he "had a warm personal regard for, and deep sense of indebtedness to all the employees" in the three Great Lakes plants where most of the light armor plate used in Navy landing craft has been produced.

"I found out that here is a steel plant which can take off its coat and go to work when a job has to be done," he said. *Next page* →

## Army-Navy "E" award to Seeger

Walter G. Seeger, president of the Seeger Refrigerator Company, is shown here being presented the Army-Navy "E" Award Flag by Lt. Col. Bailey A. Wright of the Army Air Forces, Air Technical Service Command, for the outstanding manufacture of the bomb rack for the B-29 Super Fortress, and other war contracts.

Commander George V. Jacobs, Inspector of Naval Material, represented the Navy in the ceremonies, which were held at the Seeger Refrigerator Company's plant, 850 Arcade Street, St. Paul, Minnesota, recently.

The company ordinarily manufactures commercial refrigerators for hospitals, hotels, restaurants, etc., and display cases for butcher shops, delicatessen shops, etc.

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During the brief ceremony attendant to awarding the "E", the Admiral is reported to have said that casualties among Marines who captured the Marshall Islands from the Japanese early in 1944 were relatively low, partly because of a new-type armor plate developed by Great Lakes Steel.

## International Harvestor shows pre-production models for farm refrigeration

*Pre-production model of an International Harvester 130 cubic foot walk-in cooler for farm use. Large chamber is for refrigeration of milk, meat and poultry. To the left of the door are compartments for zero temperature refrigeration.*

As reported in October *finish*, International Harvester Company's Refrigeration Division will produce and market in the postwar period a complete line of refrigeration units, designed to meet all the needs of the farm market.

International will concentrate its attention, at least initially, on refrigeration for the farms because the company has built its present business chiefly on meeting farm equipment needs of all kinds, because it is familiar with the farm market, and because its existing distribution and service organization is ideal for that purpose. While International reports no present plan to enter the urban household refrigeration market, the ultimate possibility has not been ruled out.

The International refrigeration line before the war included milk coolers and walk-in coolers, the latter being large-capacity units which serve both as milk coolers and as refrigerators for other farm produce. These units are being completely redesigned and restyled, and will be electric-powered, as will all other International refrigeration equipment.

In addition, the company will offer two new types of refrigeration, a line of Zero Chests for the freezing and storage of perishable foods, and a line of combination units, offering both zero-temperature and ordinary-temperature refrigeration in the same chest. These will be produced in a variety of sizes and models.

Since the new line is in the pre-production stage, no data as to prices are now available.

**CHICAGO DISTRICT ENAMELER'S CLUB**

**The Club's program committee has announced that the next regular meeting will be held on Saturday, February 10. Read February Finish for time, place and program.**

## High temperature ceramic coatings used on exhaust systems for aircraft and naval vessels

The National Bureau of Standards has been conducting development work on specialized high temperature ceramic coatings for about two years in an effort to meet the unusual conditions of use presented by certain wartime applications. The unusual characteristics of the coatings required include:

a. High thermal shock resistance, and

b. The ability to withstand prolonged heating at elevated temperatures and still afford protection to the underlying metal against atmospheric corrosion.

This work, which was conducted by the Bureau of Standards under the supervision of W. N. Harrison, is covered chronologically in a report by Lyman J. Briggs, Bureau Director.

Work on ceramic coatings for steel, designed to protect the metal against corrosion under operating conditions of temperature and thermal shock entirely beyond the range involved in such common use as for kitchen utensils, was begun at the Bureau in 1942. Development of such coatings was continued during 1943 and, at the request of the armed services, the application of such coatings for specific application to the exhaust systems of aircraft engines was studied.

In June, 1943, a report was made to the armed services, and to a number of cooperating companies in the enamel and aircraft industries. In the report the superior performance of coatings which had been developed in that study was strongly indicated. One of the coatings described in the report was designated as A-19, and exhaust stacks with this coating have since been brought into regular production for use on a number of models of aircraft.

More recently coatings developed by the Bureau have been specified for application on exhaust systems of certain naval vessels and vehicles using dry mufflers. Experiments are also underway by the Navy Bureau of Ships in cooperation with the Bureau of Standards for the purpose of extending the use of high temperature

→from Page 37

ceramic coatings to wet mufflers.

In referring to the terminology used, Mr. Briggs says, "The expression . . . 'ceramic coatings' . . . is preferred to 'porcelain enamels' because of the difference between the characteristics of the high temperature coatings and those of porcelain enamels as used for ordinary purposes. The appearance resulting from the lack of gloss and thinness of application which characterizes these coatings has, in some cases, given individuals the impression that no coating at all has been applied to the steel although a careful inspection, or observation of resistance to corrosion in service, would of course dispel such an impression."

### Norge has new director of engineering

Ira H. Reindel, chief engineer for Norge Division of Borg-Warner Corporation, has been promoted to director of Norge engineering, it was announced by Howard E. Blood, Norge president.

Mr. Reindel has had a long period of service with the Norge and Detroit Gear units of Borg-Warner. He joined the company in 1925, the first refrigeration engineer employed by Mr. Blood. He was offered the position of chief refrigeration engineer for the purpose of improving the Norge compressor mechanism.

To Mr. Reindel has been attributed much of the credit for peacetime simplification and refinement of the Norge "rollator" refrigerator compressor mechanism, and wartime development and improvement of fire control gearing apparatus and power-driven machine gun turrets for land vehicles, sea vessels and aircraft. All of these products have been manufactured by the company during the war.

From 1931 until the present, Mr. Reindel has been chief refrigeration engineer of the Norge Division.

## New Porcelain Enamel Institute literature

### New handbook on design and fabrication

The Porcelain Enamel Institute has just released a new handbook, "Design and Fabrication of Metal Parts for Porcelain Enameling," which it is expected will be of great interest to both enamelers and product manufacturers. The booklet includes an outline of the basic properties of modern porcelain enamel, chapters on selection of materials, design factors, fabrication methods, and definitions of porcelain enameling terms.

### "Porcelain Enamel"—new folder

A new 8-page folder issued by the Porcelain Enamel Institute, Washington, D. C., refers to porcelain enamel as "a time-proved material that offers specific design advantages and applications not available in any other finish." Representative applications for porcelain enamel are fully explained and illustrated.

Included is a discussion of the general considerations involved in engineering design for porcelain enameled products and constructive material on fabricating for enameling. Diagrams are included to illustrate correct design principles.

General information includes the description of porcelain enamel, where it can be used and why its use has proved successful. Specific advantages are explained in detail.

### Facts about porcelain enameling

Another booklet recently issued by the Institute is entitled "Interesting and Useful Facts About Porcelain Enamel." This eight-page, pocket size booklet lists the advantages of porcelain enamel as "easy to clean, weatherproof, heat and acid resisting, colorful, hard as glass, and durable." Amplification of each point is given for the benefit of salesmen.

The booklet also includes a brief outline of how porcelain enamel is made and a listing of products on which it can be used to best advantage.

### Stewart-Warner appointments

It is understood that Stewart-Warner Corporation has appointed A. R. Collins as head of the Research Department and J. H. Leslie as chief engineer of the Heater Division.

### 12 Illinois firms included in "spot" authorization

Recent announcement by WPB included a listing of twelve Illinois companies for the production of civilian goods.

Of interest to Finish readers would be the following three metal products manufacturers:

Conco Engineering Works, Mendota — Ice cream freezers and coal stokers.

Midwest Manufacturing Company, Galesburg — Metal household furniture.

National Steel Cabinet Company, Chicago — Bathroom cabinets.

### Table top production limited by steel supply

Production of porcelain table tops will be small as compared with consumer requirements until military demands for steel are considerably reduced, the Porcelain Table Top Industry Advisory Committee said at a recent meeting.

Although the manufacture of some porcelain table tops has been authorized under "spot procedure" (Priorities Regulation 25), committee members said that the difficulty in obtaining steel sheets would limit output for the present.

The committee recommended that porcelain table top manufacturers be permitted to accumulate a 60-day inventory of steel sheets, so that idle capacity could be utilized as soon as war contracts are cut back. Most of the manufacturers are still engaged in war work, but they said the industry would be seriously handicapped in resuming civilian production if they had to wait until their war contracts were cancelled before obtaining production materials.

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### Refrigeration and air conditioning dealer applications temporarily denied

### (WPB Forms 541 and 547)

In late November the General Industrial Equipment Division of the War Production Board announced that all applications by dealers for refrigeration and air conditioning equipment, including all self-contained package units, are being temporarily denied. These applications are made on WPB Forms 541 and 547. The denials do not affect applications for compressor bodies, low-sides and other repair parts.

This action was taken, according to WPB, because of the unprecedented volume of applications for refrigeration and air conditioning equipment being received from dealers and distributors. The priority ratings previously granted for inventory purposes, together with the ratings received by dealers and distributors from ultimate consumers, have resulted in a large backlog of unfilled rated orders for several types of scarce equipment, they said.

During this temporary period it will be necessary for dealers and distributors to extend ratings received from ultimate consumers to replace equipment sold from their inventories.

In the meantime, WPB officials explained, a study is being made of the problem and L-38 (General Refrigeration and Air Conditioning) may be amended so that dealers and distributors can obtain a limited quantity of equipment for inventory.

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### Stove ration certificates for oil cooking and gas heating (Amendment 9 to Supplement 1 — Ration order 9A)

Stove dealers and distributors in most areas will be granted additional ration certificates to build up their stocks of oil cooking stoves and gas heating stoves.

The provision does not apply to oil heating or gas cooking stoves, which remain under their present inventory ceilings.

Even with the increases now authorized, OPA said, stocks will still be far below normal levels. The rationing program originally limited stocks to one-fifteenth of the dealer's sales during the base year. Wartime production continues to hold actual inventories down, but this provision will allow the trade to follow its normal practice of placing orders during the winter and spring months for stoves to be delivered before the peak buying seasons.

Inventories allowed for oil cooking stoves will be at least twice those permitted initially, and greater increases will be authorized in areas where the wartime need for stoves of this type has been unusually heavy. Similarly, the allowable inventory for gas heating stoves will be at least three times as large as it was originally, and will range upward in areas where demand has increased sharply and where the necessary fuel is available.

Many factors, such as shifting wartime population, variations in seasonal demand for different types of stoves, and changes in fuel supply conditions, make it necessary to allow adjustments in dealers' inventories from time to time, according to OPA.

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### New installations for using liquefied petroleum gases prohibited

The Petroleum Administration for War will disapprove applications to install equipment burning butane or propane-butane mixture, Deputy Petroleum Administrator Ralph K. Davis has stated.

Restriction of further increases in consumption of these liquefied petroleum gases is necessary to meet increased military requirements for 100-octane aviation gasoline, Mr. Davis said. He explained that butane and butane-propane mixtures are liquefied petroleum gases that are commonly known under various trade names or as LP-Gas, bottled gas and tank gas. These gases are used extensively as industrial fuels and as domestic fuels in homes beyond the reach of gas mains. Butane is an important component in the manufacture of aviation gasoline.

Mr. Davis pointed out that this change in policy will not affect consumers who already have installed equipment in their homes or in industrial plants, but he advised consumers to conserve LP-Gas as much as possible to protect the stocks on hand.

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### Sulfuric acid shortage expected— new facilities recommended

In view of an estimated shortage of at least 10,000 tons of sulfuric acid for December and a monthly shortage of 15,000 tons for 1945, the Inorganic Acid Industry Advisory Committee recommended that the War Production Board approve the construction of new and expanded facilities to produce approximately 478,000 tons of acid annually.

Nation-wide allocation of sulfuric acid was suggested to the committee as a possible means of alleviating the shortage, which at the present time is most acute on the East Coast. However, committee members pointed out that distribution problems could be solved without the necessity of allocation if sulfuric acid production were substantially increased.

Since December, 1943, sulfuric acid has been allocated on the West Coast area in accordance with provisions of Order M-257.

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### Utensil committee suggests relaxation of material inventory restriction

One of the principal bottlenecks in the enameled ware industry is the irregular delivery from the mills of cold rolled steel, 28 gauge and heavier, according to a report of the Porcelain Utensil Industry Advisory Committee at a recent meeting.

Relaxation of the 60-day material inventory restriction would tide manufacturers over such later delivery periods, committee members said.

The situation in shipping containers, a predominant problem in the enameled ware industry, was described by a government representative as having improved. However, there is little possibility of increased container-board allocations during the fourth quarter, he told the committee. Container-board requirements for newly-permitted civilian items, such as electric irons and aluminum ware, may offset any increases in supply. The next two or three months will determine whether relaxations in container usage will be permitted, he said.

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### Restrictions eased on "Surface Heating Equipment" (Schedule I of Order L-107)

Removal of restrictions limiting the types and sizes of extended surface heating equipment that may be produced, together with other simplification restrictions, was announced by the War Production Board recently.

Extended surface heating equipment includes unit heaters, unit ventilators, convectors, blast heating coils and special heating coils for space heating or for industrial heating or drying.

Schedule I or Order L-107 was revoked. Order L-107 itself, which requires a rating of AA-5 or better and a specific delivery date before delivery can be made, still remains in effect. These restrictions were originally put into effect July 28, 1943, to help satisfy the demand for such equipment from the military and new war plants.

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### New head for WPB plumbing and heating division

C. Ray Davisson has been appointed Director of the War Production Board's Plumbing and Heating Division to replace Joseph F. Wilber who resigned November 2, 1944, to return to his business as consultant engineer in Boston.

Mr. Davisson has been serving as Deputy Director of the Plumbing and Heating Division since October 2, 1944. He came to the WPB in January, 1943 as Chief Industrial Adviser for the Office of Industry Advisory Committees.

Prior to coming to WPB, Mr. Davisson was connected with the Carrier Corporation of Syracuse, N.Y. He was graduated from Ohio State University in 1926.

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### New consumer durables rationing branch represents a merger

The Deputy Administrator for Rationing has effected a merger by which two divisions were combined and two branches within the division were united. The Automotive Supply Rationing Division and the Fuel Rationing Division were amalgamated to form the *Fuel and Automotive Rationing Division;* and the Automobile Rationing Branch and the Stove Rationing Branch were merged to form the *Consumer Durables Rationing Branch.*

Mr. John G. Neukom is Director of the new division. Mr. Fred L. Parker, who is well known to members of the stove industry and who has been Chief of the Stove Rationing Branch, is Associate Director. This should insure stove industry representation.

Official OPA announcements indicate that the future may see even further changes in rationing programs "necessary to the stabilization of the domestic economy in the process of reconverting American industry from a wartime basis to a peacetime basis."

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### Disposal of surplus war property

In the five months since June 1, surplus war property disposed of by disposal agencies amounted to $111,779,000 at 76.1 per cent of cost or appraised value, which compares with total acquisitions of $746,835,000 during the same period, according to an announcement by the Surplus War Property Administrator.

Summarized below are disposals, by agencies, during five months (June 1 to October 31):

| | |
|---|---|
| Treasury Procurement | $ 50,979,000 |
| Reconstruction Finance Corp. | 56,772,000 |
| Maritime Commission | 1,762,000 |
| War Food Administration | 2,266,000 |
| TOTAL | $111,779,000 |

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### More labor advisory committees planned

The War Production Board has announced completed plans for the early creation of twelve new labor advisory committees in addition to the 19 already functioning, to assure labor more extensive participation in advising how to expand war production and in reconversion proposals.

While it is stated the main purpose of the committees will be to familiarize labor groups with continuing WPB programs and to get labor's recommendations for increasing military production, the committees will also suggest activities to the Board to speed the processes of reconversion after war programs have been met, officials said.

These labor committees differ from the industry advisory committees, which number 761, in that the labor groups cover major industries as a

whole — steel and automobiles, for example—rather than specialized segments of them.

The 19 labor advisory committees now in operation are: Anti-friction bearings, automotive, coal tar, cotton textiles, *domestic laundry equipment*, domestic vacuum cleaners, forge and foundry, electric flat iron, fractional horsepower motors, jewelry, logging and lumbering, machine tools, *mechanical refrigerators*, printing and publishing, radio and radar, sewing machine, *steel*, superphosphate and wrought iron.

The proposed new labor committees will represent the following fields: *Building materials*, construction machinery, electrical machinery, farm equipment, furniture, office machinery, *plumbing and heating*, rubber products, transportation equipment, general industrial equipment, *general electrical appliances*, and non-ferrous mining and non-ferrous mill products.

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### Construction order interpreted with regard to machinery installations and plumbing and heating equipment (Interpretation 11 to Conservation Order L-41)

An interpretation to the construction order has been issued by WPB to clarify provisions governing building alterations that may be made in connection with installations of machinery or equipment permitted under Direction 2 of the order.

The interpretation states that the alterations which can be made without WPB permission are only such as are directly required in connection with the installation or operation of the machinery or equipment being installed. Alterations not directly re-required in connection with the installation or operation may not be made under the Direction.

For example, new walls or partitions may be put in where required for the operation of the machinery or equipment, but the installation of offices, office partitions, storage rooms, toilets, etc., are not permitted except by specific WPB approval.

The interpretation further points out that the Direction does not limit the cost of building materials which may be used in connection with the installation of machinery or equipment to be used in a business designated on List A of Controlled Materials Plan Regulation No. 5; on Schedule I or II of CMP Regulation No. 5A; or in a business given priorities assistance by any P or U order for maintenance, repair or operating supplies. However, in the case of machinery or equipment to be used in any other business, the MRO symbol and an AA-5 rating may be used to get $500 worth of materials for each installation or related alteration. The amount of unrated materials which may be obtained for such an installation is not limited by the Direction.

Processing or service machinery or equipment may be installed in an existing building regardless of how the equipment is obtained. However, building service equipment (plumbing, heating, lighting fixtures and the like) may only be installed when obtained by means of an approval on a special application form such as WPB-541, WPB-542 or WPB-1319. Building service equipment not obtained through approval of a special form may not be installed under Direction 2.

Plumbing and Heating equipment not included on List A of Limitation Order L-79 (Plumbing, Heating and Cooking Equipment) is normally obtained without any application to WPB and can not, therefore, be installed under Direction 2 of Order L-41.

If plumbing and heating equipment included on List A of Order L-79 is to be installed in a residence, application may not be made on WPB-1319, but must be made on Form WPB-2896 (Application for Residential Construction Under Order L-41) and filed with the Federal Housing Administration. Approval of this housing application gives the applicant authority for the needed alterations or new construction.

Plumbing and heating equipment which can not be obtained on a special form, and therefore can not be installed under Direction 2, may be installed to the extent permitted under the annual allowance given by Order L-41 or by other provisions of that order. If an installation is not permissible under L-41, an application under that order should be filed in the usual manner.

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### Lead may be allocated

Allocation of lead is a possibility, the Tin, Lead and Zinc Division of the War Production Board has reported. Division officials emphasized, however, that no decision had been reached as to the percentage of allocation which might be necessary.

The critical lead situation was reported by WPB officials at a special meeting of the Lead Producers' Industry Advisory Committee recently. Government spokesmen stated that current lead consumption was exceeding production to such an extent that the government stockpile was being reduced below a safe margin. Continued heavy civilian demand for such purposes as storage batteries and paints have cut heavily into the dwindling supply, they said.

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### New formed metal pumbing ware industry advisory committee

The producers of formed metal plumbing fixtures now have an industry advisory committee consisting of seven members.

The members are:

H. C. Beresford
Murray Corporation of America
Detroit, Michigan

William H. Brett
Alliance Wares, Inc.
Alliance, Ohio

E. P. Calkins
General Porcelain Enameling Co.
Chicago, Illinois

R. B. Jenkins
Briggs Manufacturing Company
Detroit, Michigan

M. J. Keedy
Ingram-Richardson Mfg. Company
Frankfort, Indiana

Charles A. Morrow
Mullins Manufacturing Corp.
Warren, Ohio

C. L. Stoup
American Central Manufacturing Co.
Connersville, Indiana

It will be the purpose of the industry committee to consult with OPA and make recommendations concerning manufacturers' problems of pricing, delivery terms, and trade discounts on sales of the products.

## Application of white enamels direct to sheet steel

*(Continued from Page 26)*

### White direct to special steel

A recent commercial trial of white finish on special steel by each of three frit companies indicated that 90% of the ware processed can be had in two coats of white on the steel. The average thickness of the enamel coating is between 0.008″ and 0.010″ with a reflectance of 73%. This can be compared with the present practice of from 0.0035″ to 0.004″ for blue ground coat plus 0.008″ to 0.011″ for white, with a total thickness of 0.012″ to 0.015″, or roughly a 30% to 50% reduction in thickness in coating for the same cover power.

In the commercial trials referred to, both the original and second coat of white were sprayed. Only the face side was finished in two coats. The average conditions for firing the enamel were: A temperature of 1540° F., and a chain speed of 10′ to 12′ per minute in a continuous furnace with a 40′ firing zone and a 40′ preheat zone.

These results indicated without doubt that the steel, the enamels, and the processing are exceedingly stable — secondary reactions do not keep on occuring during the firing and application of subsequent coats of enamel to cause trouble. Parts that were poorly sprayed in first coat covered extremely well in second coat. Actual losses were low. The bond of the enamel to the metal was somewhat variable but no fish scale was in evidence. In all these studies, fish scale has not at all been in evidence, nor has it been any problem whatsoever.

### White as ground coat on standard steel

As to the second phase of the enamel problem, special enamels have been developed which can be applied as opaque white ground coat to normal enameling stocks. This type of enamel substitutes other bonding agents for the blue cobalt used in dark ground coats. These agents remain white in the fritted and fired enamel. The white enamel has, as yet, the typical ground coat surface characteristics and develops good bond with wide workability. Considerable quantities of this have been run in production as large production trials, but there has been no general commercial exploitation. This highly opaque white ground coat has the drawback that it is more expensive in frit form than the conventional blue ground coat, and the same total weight of white ground coat and cover coat is required to give the same covering power as white cover coat on blue ground coat. The total thickness of the enamel on the face side is less than that required for blue ground coat plus white cover coat. But, the ground coat itself must be applied considerably heavier than normal blue ground coat and the extra weight of enamel required on the back of the ware results in the total weight of the enamel on the piece being the same.

These trials have shown, however, that the white ground coat has a big advantage over blue ground coat in much lower losses on the mounting line. The white ground coat by actual records has greater resistance to damage from flexing and impact. The ultimate goal of the frit and steel suppliers is to furnish to the enameler a combination of enamels and steel which will permit the enameler to lower the thickness of coating from the present average of some 0.015″ to 0.018″ for two and three coats to a thickness of approximately 0.005″ to 0.006″ with a reflectance of at least 75% as measured on the Hunter Reflectometer. It is also desired that this enamel have at least Class B and preferably Class A acid resistance as tested by the Porcelain Enamel Institute Standard test. I believe that I can say that while this is not even experimentally possible now, it is within the realm of possibility for some time in the future. We can at least strive with some confidence, with these specifications as a goal.

### Technique of application

To realize the present possibilities of white on steel, the enameler must be prepared to do his part. Haphazard methods of cleaning the metal can no longer be tolerated. A ceramic engineer or chemist should be in charge of all the highly technical operations pertaining to the preparation of the enamel, and very accurate control is required for each step in the cleaning, pickling, nickel strike, neutralizing and drying operations. This accurate control must be carried out to insure success whether special steels are used or not. Insoluble iron salts left on the metal can be most disastrous and prevent the realization of this goal. A good nickel flash is also essential.

The same care and control must be exercised in all the enameling operations — spraying, drying and firing. For example, it will do no good to have an enamel and steel combination that is suitable for running one coat at 0.005″ to 0.006″ or 0.008″ to 0.010″ in thickness if the enamel is applied indiscriminately from 0.006″ to 0.018″.

I have purposely avoided any discussion of relative costs. It is quite possible that the steel and frit will have higher unit costs than the conventional types of enamels and steel now available, and that the processing will cost more. The savings in net costs of ware finished, improvement in quality and lower losses in mounting and service should be considerable and go a long way toward maintaining the usefulness of porcelain enamel on steel.

I want to express to you the necessity of approaching this problem with complete open-mindedness and with no preconceived idea that all the difficulties have been overcome. If you are willing to work with your supplier and maintain a development or research point of view and insure adequate control procedures in your plant, I believe that you will be able rather soon to take advantage of these new developments. However, do not hinder or curtail the progress that has been made by assuming that because the first results may not be all that are expected, the whole program is impractical and not worth further consideration.

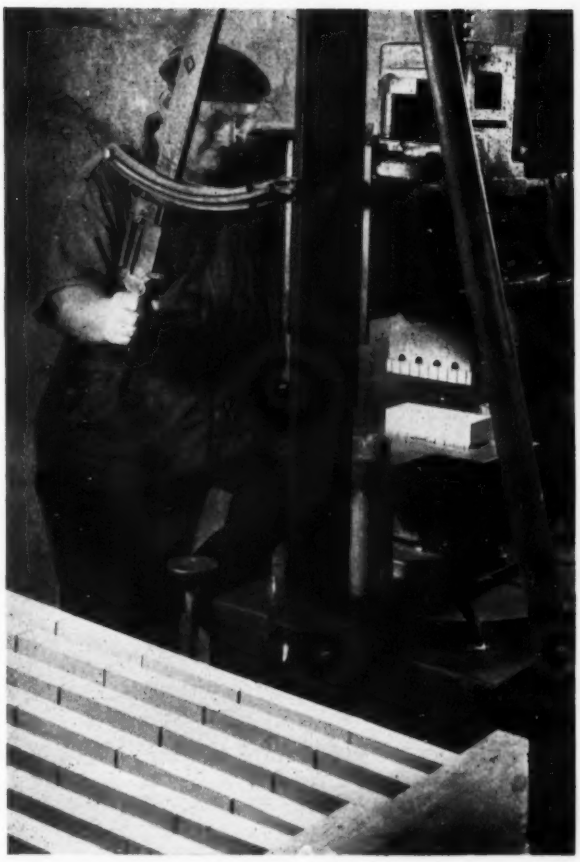
*More on Page 50* →

# ORDER NOW — AND BE READY

ALTHOUGH the majority of enamel plants are not now in operation, wise enamelers are preparing for the future. We are now sixty days behind on porcelain ball shipments. For this reason we urge your early consideration of your requirements for balls and brick.

Under normal conditions we pride ourselves on speedy delivery (usually same day the order is received). Today much of our plant is on important war work.

We suggest a current check of all your mills, and the placing of an early order for your porcelain requirements.

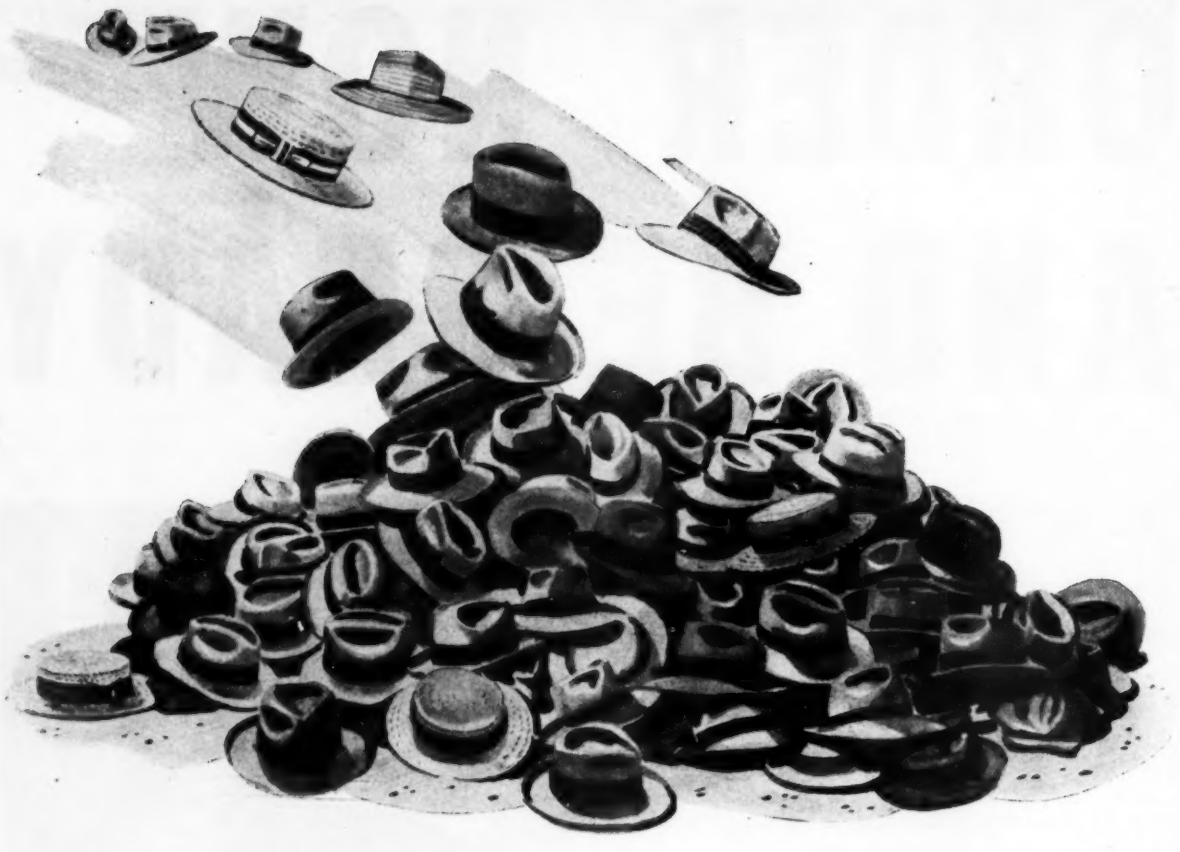


**McDANEL REFRACTORY PORCELAIN CO.**

BEAVER FALLS, PENNSYLVANIA

Chicago Vitreous Enamel Product Company • Exclusive representatives for the enameling industry.

**McDANEL MILL LINING BRICK**



# Enamelers are parting with their old hats

OLD hats and old mill additions are mighty hard to change. Once the change is made we often wonder how we got by with the old. The improvement in Frit during the past few years makes a change well worthwhile. Field performance of Harshaw Frits is good. Harshaw research is active. Check with Harshaw on new developments in Frit and in mill additions.

### GROUND COAT

Blends of wide range Ground Coat Frits yield enamels of greatly extended firing range, improved bond, and excellent workability—frequently make practical a single firing temperature for both covercoat and groundcoat enamels.

### COVER COAT

Coverage of standard whites has been increased—Harshaw Frit 109 gives 74% reflectance at 40 grams. On special enamels, you will be surprised at the workability and opacity of the newer AR's.

HARSHAW

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

# A. G. A. Laboratories hit by fire

## temporary offices opened

IN THE recent devastating Cleveland fire severe damage was inflicted on the American Gas Association Laboratories, and resulted in injuries to eight employees and five visiting manufacturers, who were burned while escaping from the fire area.

According to laboratory officials, the fire spread in the matter of a very few seconds so that it completely gutted all offices and destroying the majority of records and research data, with the exception of some testing and inspection files which were charred but are still usable. Fortunately alarms spread by a number of members of the staff gave sufficient warning to enable every person to leave the laboratory without injury. Those burned are reported to have been among the first to leave the building, and apparently suffered from the effects of the intense radiant heat in the street while making their escape from the fire area. Laboratory officials further state that contrary to an earlier report, no explosion occurred in the laboratory at any time, and no fire originated on their premises.

Three women scientists, Virginia Boyer, Marjorie Gast and Elizabeth Myers, were among the injured employees. Others were E. J. Abbott, Herman Benditz, John J. Matter, J. B. Morton, and T. W. Patterson. The manufacturers burned were Marius Marrapese of The W. J. Schoenberger Co., Leslie Vixler of The Patrol Valve Co., Earl Hillebrand of the Florence Stove Co., J. C. Scherrer of The Security Manufacturing Co., and George Reznor of The Reznor Manufacturing Co.

While the second floor offices suffered the most, other sections of the building and its equipment were also badly damaged. Loss of records and need for checking equipment, including miles of piping, will require considerable time before research and testing activities can be resumed on a normal basis.

Plans to expedite restoration of testing activities as quickly as possible are being formulated. Determination of the full extent of losses and making of necessary building repairs will require time. A substantial part of the testing equipment was apparently undamaged except for the effects of smoke and water. The majority of appliances were not seriously damaged although a large number of accessories, awaiting test, were destroyed.

The substantial and fireproof construction of the Laboratories was credited for keeping it from being completely destroyed and was instrumental in saving surrounding buildings and homes on two sides. These remained practically intact, except for broken windows. The Laboratories' four gas holders likewise withstood the fire with little damage.

Temporary offices have been established in a research laboratory of the American Society of Heating and Ventilating Engineers, where they will remain until such time as the Laboratories can be fully re-established. The temporary location is 10700 Euclid Avenue, Cleveland 6, Ohio.

*Photo at right gives some conception of the fire damage to laboratory offices.*

*General view of fire swept area north of the laboratories. Scene is looking north on east 62nd street.*

## Will porcelain enameled metal replace the masonry chimney

*(Continued from Page 14)*

*The hot gas duct.* The products of combustion are moved from the furnace to the outside atmosphere more rapidly because of the very small surface resistance of porcelain enamel. The round flue prevents disturbance to the flow of the flue gas normally caused by square or rectangular chimneys. The properly constructed porcelain enameled chimney is free from joint leakage so common in brick chimneys, particularly after age has caused some deterioration at the brick joints. Joint leakage reduces the efficiency of a chimney, as a hot gas duct.

*An insulated wall.* Ordinary commercial asbestos pipe covering is not suitable inasmuch as it must withstand temperatures in excess of the heat of crystallization of asbestos fibres. A new type of prefabricated asbestos air cell insulation has been developed which, when used as an insulating sleeve around porcelain enameled pipe, is found to fully meet all requirements for safety and to withstand all thermal shock.

*A lightweight structure.* The dead weight of the porcelain enameled flue is well within the allowable limitations which the ceiling and roof joists can carry. This lightweight construction permits the complete elimination of the chimney foundation. As the house settles, a chimney suspended from the ceiling and roof will not pull away from the house to cause cracks. Floor space is saved because the suspended flue can be installed directly over the heating source if desired.

*A manufactured product.* All safety features can be built into the porcelain enameled flue so that no skill is required in its installation. This contributes to greater freedom from fire hazard, sometimes attributed to faulty contruction. The porcelain enameled flue can be designed so that its installation time is a small fraction of the time required to build a brick chimney. At one Government Housing Project, the average time of installation was 20 minutes per flue per 2 men. In the more elaborate layouts where porcelain enameled tees are used, the installation time may run up to 1 to 1½ hours per 2 men per flue. In general, it is safe to say that the total time of installation will be less than 3 man hours. Obviously this is a big help to the prefabricated house industry. It also permits heat in the house the same day it is erected.

*The protection of all interior surfaces.* Acid resisting porcelain enamel (designed for the purpose) has been found to be the most suitable protective coating. This protection has been proved, through 15 years of use, to be impervious to flue gas condensate.

### A new market for porcelain enameled metal

The future of the porcelain enameled flue as a new market outlet for the industry can be developed because of the many logical applications. Naturally, public acceptance will have to be gained, but some missionary work has been accomplished. Of course a good deal of additional missionary work will be required before there is general acceptance of porcelain flues. Various building officials have been approached and their reaction has been very friendly and often times favorable. Most building officials recognize the importance of the Underwriters' Laboratories findings and such listing will go far toward general acceptance of porcelain flues.

Principal advantages can be reduced to a few words as follows: *No foundation is required; greater draft per foot of chimney height; lower exterior surface temperatures; quick and easy installation; less expensive; and rapid heating and cooling with better draft and higher efficiencies for automatic heating equipment.*

One of the best potential post-war markets will be the use of porcelain enameled flues in gasoline service stations. Such application, however, must be approached from a standpoint of *an engineered chimney* rather than a *porcelain enameled product.* It was not until the consideration of architectural porcelain as an engineering problem, requiring specialized engineering knowledge, was accepted that an adequate solution to the problem was approached. It will also be found that porcelain enameled flues will have to be engineered to the application, and the engineering problems will have to be approached from two viewpoints—first, as a draft producing mechanism and, second, as a safe vent for flue gas.

The use of porcelain enameled flues will make it possible to combine the appearance of the exterior of the service station with the exterior surface of the flue which projects above the roof. A double shell will probably be found advisable for flat roof, one-story buildings, but it will be only necessary to extend the flue three feet above the roof surface in order to obtain sufficient draft. Downdraft diverters can also be attached to the porcelain enameled flue where the service station is sandwiched in between tall buildings.

New designs will undoubtedly be evolved. There is also always the possibility of some improvements in the methods of porcelain coating. It can be said now, however, that the ideal chimney is closer to realization through the use of porcelain enameled metal. The home builder will be able to obtain a better product for less money and a flue gas venting system more readily adapted to the type of heating equipment he may select. The location of the chimney can also be made in accordance with the best engineering practice rather than structural limitations now required by the brick chimney.

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### More new markets

It is the opinion of many who have studied market potentials for porcelain enameled metal that there are possibilities in a number of fields in which the materials of our industry have never been used to any major extent. *Finish* will keep you posted on these new uses as evidence is obtained.

# PORCELAIN ON STEEL TILE

## Combines Beauty with Permanence

Exclusive patent-protected foundation sheet assures rigid, accurate assembly. Waterproofed. Verminproofed. Waterproof adhesive on back of tile makes lifetime bond with foundation.

Formed edges of tile fit foundation sheet grooves which are designed to take all tile sizes. Rapid-setting waterproof white or colored cement grout fills the joints between the tile.

The final step is to remove the excess grout with a squeegee; joints are pointed; tiles cleaned with sponge and fine steel wool.

# VEOS

**PORCELAIN ON STEEL**

# TILE

***Is now installed in 15,000 finest restrooms of 20 major oil companies***

The united opinion of progressive architects of 20 of the leading oil companies is high praise indeed. Everybody likes Veos Tile. It will stand rough treatment and is guaranteed against crazing, cracking and color fading for the life of the building. Quick installation without special wall preparation means little or no interference. Light weight permits use on old walls and *even* ceilings. There is no periodic refinishing expense . . . no servicing except simple washing. Veos Porcelain Tile is assured of primary consideration in postwar planning . . . both new construction and remodeling. It has the beauty for the finest homes and the ruggedness for the hardest industrial use.

### 10 BIG ADVANTAGES

*for Residential, Commercial and Industrial Buildings*

- Rapid installation
- Upkeep at a minimum
- Quick, easy servicing
- Won't crack
- Won't craze
- Won't fade
- Won't loosen
- Won't warp
- Won't sag
- Guaranteed for life of building

*Write for further information.*

**CLYDE PORCELAIN STEEL CORPORATION**
**CLYDE, OHIO**

## Electrostatic spraying offers new possibilities for enamel application

*(Continued from Page 19)*

trically grounded conveyor; thus, the ware on the conveyor is the same potential and polarity as the conveyor itself. The high potential electrodes are established at proper positions along the side of the conveyor. As the conveyor moves along it carries the items through this electric field. The automatic spray guns, located at one end or other of the field, deliver the atomized enamel into the field. The pressures used on the automatic guns and enamel for this process are only about one-fourth those normally used by hand spray methods. Some features of the enamel must be adjusted to enable its being handled at these low pressures. Enamels may meet these requirements by simple adjustments which do not chemically alter the enamel in any way after it has been dried.

### Suited to high production parts

By this method of application there are several advantages to be expected on an item that lends itself well to high production. These may be listed as: highly increased spraying efficiency, uniformity of coating, and saving of highly skilled labor. One of the greatest advantages is that it greatly enhances the possibility of one coat ware on many items that now require two coats, usually for no other reason than uniformity of application.

Much brushing can be saved on flanged panel ware by this process by properly placing the panels on the conveyor and taking advantage of the electric field's tendency to change the direction of the path of travel of a particle of enamel after it becomes electrically charged.

### Limitations to be expected

The major limitations are similar to those of the electroplating industry. There is considerable difficulty in electrostatically coating the interior of an item, unless the item is large enough that an electrode may be automatically inserted into the interior as it is being carried on the conveyor. The uniformity of deposit on an exterior surface possessing protrusions and depressions is in proportion to the uniformity of contour.

Any item that now would lend itself to automatic spraying would be an ideal item for this process; but too, this process makes it possible to spray automatically many items that do not lend themselves readily to conventional automatic coating. Typical examples might be listed as: flanged panels, cylindrical items of any size that are to be coated on the exterior, or small fabricated items produced in large volumes.

The future of the porcelain enamel industry depends to some degree upon the ability of a porcelain coated item to compete in price with similar items coated with organic finishes. In many instances the electrostatic spraying process is expected to assist in lowering the production cost.

Porcelain enameling, like many other industries, made very little progress in terms of large scale production until recent years. Advancement of porcelain finishing and enamel manufacturing in the last century has, however, been little short of phenomenal. To adapt this finish to the mass production of steel products was no small task. Much credit should go to leaders and technical men in the industry who have brought porcelain enameling to a plane of continuous furnaces, automatic spraying and other semi-automatic conveyorized processes. These labor and time saving features, along with improvements of enamel as applied to steel, give the enameling industry a very bright picture for the future.

Electrostatic spraying should prove to be a worth while step forward in the application of enamels in the future. Only minor adjustments are necessary in the enamel. It makes possible much saving of enamel as well as labor and process costs. The process lends itself best to high speed repetitive or mass production plants.

## The how and why of sign advertising—Part X

*(Continued from Page 24)*

with outstanding success. They were able to buy them in quantity for much less than they could be bought at retail and consequently they did represent more than the cost in value to the recipient. At the same time, they offered to replace any knives that failed to hold an edge or broke while in use. Few knives were replaced, and the offer brought them a large volume of good will.

### Well-kept roadside signs are approved

A recent survey of 574 companies showed that 97.8 per cent had no direct evidence that their signs were objectionable to the public. Advertisers employing dignified, well-kept signs, erected on ground leased for that purpose and observing the local regulations, can be confident that their signs will be well received.

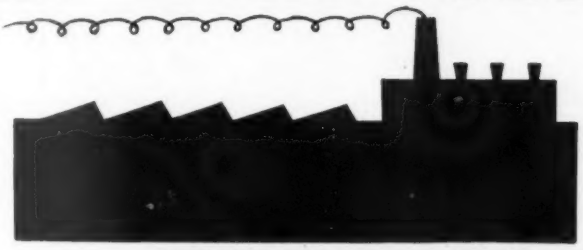
Another objection to roadside sign advertising — that small boys with rocks and grown ups with shotguns will damage them — no longer appears justified. One sign erection and maintenance company, which services campaigns of many thousands of roadside signs, offers to replace without additional charge any signs found damaged on their semi-annual inspection trips — a substantial endorsement of the confidence they have that signs are no longer destroyed wantonly. A few signs, of course, suffer injuries of this sort, but in an entire campaign the number will be small.

By way of summary, then, it is apparent that alert advertisers in many fields are already availing themselves of the economical publicity of roadside signs. They have solved the problem of distributing such signs, sharing the cost with their local representatives, and getting them erected. In return they foster dealer good will, place their message before America's mobile population, and thus get live identification and mass advertising value at exceedingly low cost.

# INDUSTRY'S "FOUR STAKES" IN THE INDUSTRIAL

# WASTE PAPER

# SALVAGE PROGRAM



## INDUSTRY'S "FOUR STAKES" IN WASTE PAPER SALVAGE

### STAKE NO. 1

**Waste paper provided by industry is an essential raw ingredient in the manufacture of paper and paperboard products necessary for military and essential civilian uses.**

### STAKE NO. 2

**Waste paper is essential to make the containers that help keep your business alive by distributing the products you make.**

### STAKE NO. 3

**Waste paper in most industrial plants can be sold to waste paper dealers. It is a source of extra profit to your company.**

### STAKE NO. 4

**Waste paper in the form of old files, obsolete records, loose paper around warehouses, receiving departments and shipping departments takes up space that costs money and slows down efficiency.**

Space and production costs for this advertisement donated by Finish in the interest of the National Waste Paper Salvage Program.

## We use pickling tanks that are built to last

*(Continued from Page 20)*

**Listing of the physical properties of the phenol-formaldehyde resin cements**

| | *Type 1 Phenol-formaldehyde* | *Type 2 Modification of Type 1* |
|---|---|---|
| Adhesive Strength Lbs. per sq. in. | 500 (min.) | 500 (min.) |
| Compressive Strength Lbs. per sq. in. | 10,000 | 10,000 |
| Tensile Strength Lbs. per sq. in. | 1,000 | 1,000 |
| Absorption % of wt. | 0.75 | 0.75 |
| Maximum Service Temperature Degree F. | 360 | 360 |
| Coefficient of Expansion | $6.4 \times 10^{-6}$ | $6.1 \times 10^{-6}$ |

aired shale or clay, thoroughly vitrified to have the following general physical characteristics:

| | |
|---|---|
| Absorption | 3% maximum |
| Compressive strength | 8000 p.s.i. minimum |
| Loss in sulphuric, hydrochloric or nitric acids | 0.2% maximum |
| Bonding surfaces | Scored or wire-cut for maximum adhesion. |

The cement used for bonding the acid-proof brick lining on this type of installation depends on the acids being used in the pickle bath, and the maximum temperature of operation. In our case, of course, the pickling acid for porcelain enameling is hot sulphuric.

To install the brick a phenol-formaldehyde (bakelite type) resin cement is used. Applied as a mortar, it sets by chemical reaction to bond the brick together with an infusible bond. This cement is said to be inert in sulphuric, hydrochloric, phosphoric and hydrofluoric acids at temperatures up to 360° F., and does not spall or contaminate the bath. It is also unaffected by solvents, oils, greases or mild alkalies.

A modification of this synthetic resin is claimed to be inert to all alkalies regardless of concentration, as well as to most acids.

There is nothing particularly complicated about the installation of tanks of this type. As a matter of fact, our own workmen installed these tanks at the Topton plant under the supervision of the manufacturer of the tank materials.

For smaller portable tanks it is common, I believe, to use a welded steel outer supporting structure instead of reenforced concrete. In this way any tank of such a size that can be loaded on a freight car may logically be fabricated and lined complete in the manufacturer's plant and shipped ready for service.

The tanks which we installed, being 17′ x 6′ x 4′6″, are of a size which would be used in many production enameling plants and, of course, must be constructed at the site.

We are using two of these pickling tanks with 7% sulphuric acid at 150° F. They have been in continuous service for sixteen hours daily, over a period of more than five years without causing any trouble to our operation. Several repairs to the outside of the concrete shell have been made where acid carry-over or splash was allowed to stand next to the concrete. These repairs could have been eliminated with a few slight changes in design.

From the viewpoint of continuous operation without lost time due to shut-downs for repair, maintenance cost, and acid loss, these tanks have more than paid for themselves. They are still in good condition after more than five years of hard service and should have many more years of life.

The same type of construction may well be used for floors, trenches, manholes and neutralizing sumps in the modern enameling plant of the future.

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## . . . white enamels direct to steel *(from Page 42)*

I believe that a patient, cautious and helpful attitude toward the application of the white directly on the steel will pay large dividends in post war enameling. We do not need to fear the competition of other finishes and materials if we in the enameling industry can show that enamel is still the best, the cheapest, and the most durable material available. White on steel should be one of the major developments of the industry in the post war period.

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## Industry publicity *(from Page 30)*

Newsletter we find the following: 'You may be interested to know that the Aluminum Cooking Utensil Co. (The Alcoa subsidiary which has the Wear Ever line of pots and pans) plans after the war to make a whole line of aluminum kitchen furniture—everything from chairs to storage cabinets. Incidentally, the firm has just started a new general advertising campaign . . . ' And remember, here we have past masters of promotion and public relations, who will use the latest and most effective techniques of publicity. They will be constantly hammering away to create the impression that nothing is more desirable than an all-aluminum kitchen. It will not be enough for the porcelain enamel industry to develop and produce products which it considers superior for the purpose. If the public is to choose porcelain enamel instead of aluminum, plastic or some other material, not only for kitchen equipment but countless other products, they must be impressed with the advantages of porcelain enamel. One powerful influence to accomplish this will be a well organized, well integrated and well developed public relations program."

## The Finish Line *(Continued from Page 9)*

a conception based on the materials and processing technique of twenty years ago.

**The Final Round — The War** — *September, 1944*

We have been asked to voice to our industry the plea of highest military authorities that "no man knows when the war will end and we must produce until the last shot is fired."

Says General Somerville: "This is the final round. There isn't any doubt about that, and if you can give these fighting forces what they need, all the heavy artillery they need, all the trucks they need to haul that ammunition; if you give MacArthur the tents he needs so he can take care of his men without stopping to build shelters, they'll push along fast enough and everybody is perfectly willing to do it."

**Good Signs** — *October, 1944*

To say that nothing is being done to stimulate interest in porcelain enamel would be definitely unfair. It is good to see the Porcelain Enamel Institute again sponsoring an educational and promotional campaign to trade and specialized fields. Some of the metal and raw material suppliers are also doing their bit in the consumer field to educate the public and promote the use of porcelain enameled metal.

These are all good signs — but — let us remember that so far we are only scratching the surface and there is always much more to be done.

**A Logical Question** — *November, 1944*

Why build a refrigerator that is designed to last for ten, fifteen or more years from a mechanical standpoint and then give it a finish that may, in many instances, be shoddy in half that time.

We predict, a high degree of success for the manufacturer who first introduces a "standard" refrigerator of popular size with porcelain enameled exterior, and *prices it with a differential to include only a proved difference in manufacturing cost.*

**What are the Facts?** — *December, 1944*

Never in the history of high production porcelain enameling has there been the expansion in enamel plant facilities that is taking place, and will take place to a greater degree when materials and equipment are more readily available. Literally dozens of continuous furnaces are on order, and will be installed along with all kinds of the latest in modern enameling equipment. The people who will be installing them have kept up to date on enameling developments — they *know* that there will not only be *more* enameling but also *better* enameling done after the war than at any time in the history of the industry.

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With 1944 behind us we are beginning what may well prove to be a very important year in the history of our industry — certainly an important year in world history. If we all pull just a little bit harder during 1945, we should face another year with even greater industry progress and a happier world-wide situation.

Dana Chase

*Editor and Publisher*

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## More Industry News

### Walbridge to Porcelain Metal Prod.

Announcement comes from Milton Gallup, president of Porcelain Metal Products Company of Pittsburgh, that effective January 1, Earl Walbridge, formerly with Erie Enameling Co., Erie, Pa., is associated with the Carnegie, Pa. organization in sales and development work.

Mr. Walbridge is well known to the industry through his former connection and his participation in porcelain enamel industry activity.

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### Lindemann and Hoverson Get Army-Navy "E"

It is reported that the A. J. Lindemann and Hoverson Company, Milwaukee, Wisconsin, are the recipients of the coveted "E" emblem for their war production achievement.


## Enameling Equipment For Sale

Available: enameling equipment for immediate delivery, for use in a single, box-type furnace plant. Equipment consists of the necessary fork, burning bars, hanging rack, pebble mills, etc.

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Write c/o Box 451

finish

360 N. Michigan Ave., Chicago 1, Ill.